Operation

ProControl™ 1KS

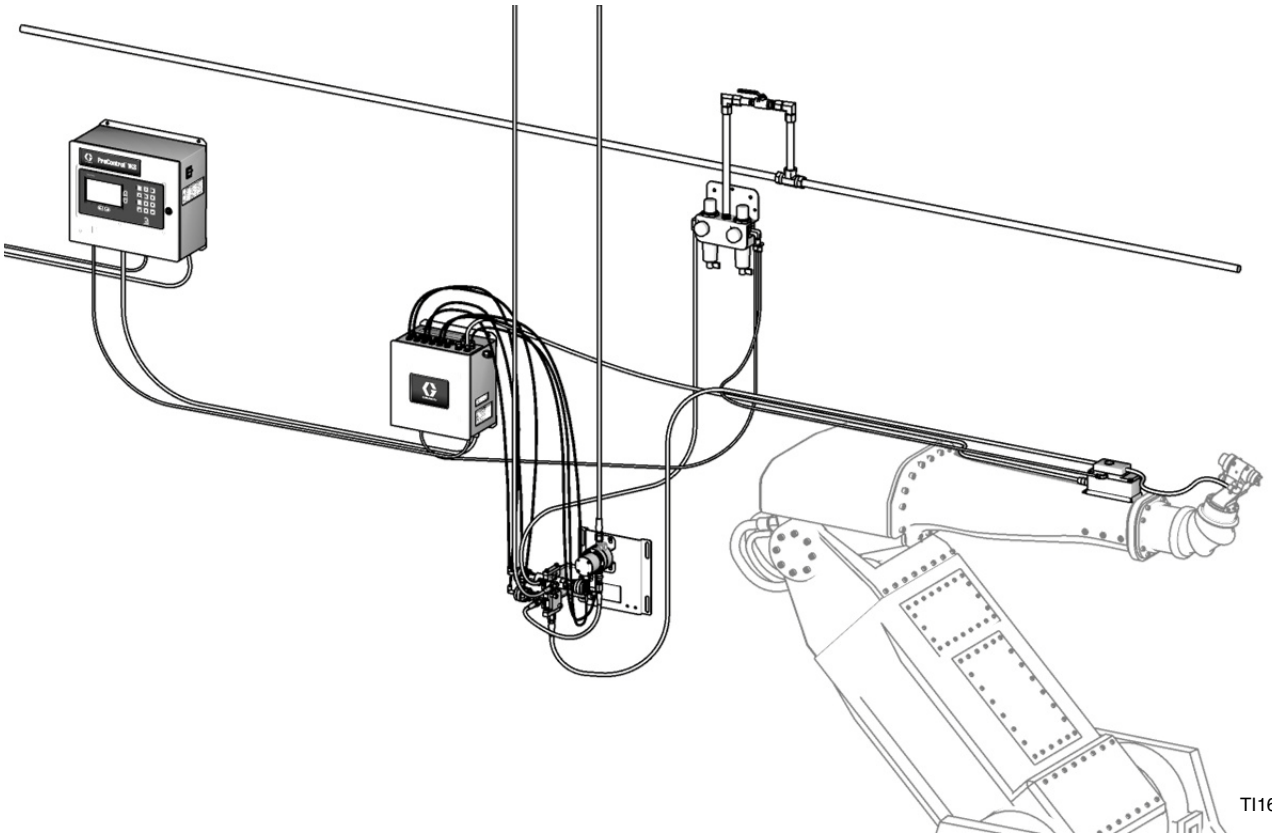
3A1080C
EN

Automatic system for fluid management of single component coatings. Includes flow control, flushing, and color change. For professional use only.

Approved for use in explosive atmospheres (except the EasyKey).

Important Safety Instructions
Read all warnings and instructions in this manual. Save these instructions.

See pages 4-5 for model information, including maximum working pressure. Equipment approval labels are on page 3. Some components shown are not included with all systems.



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Related Manuals

Component Manuals in English

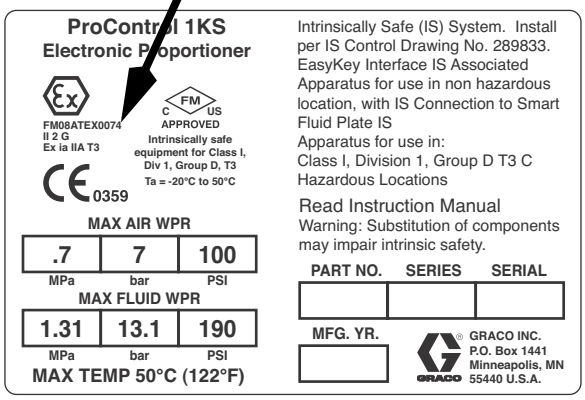
Manual	Description
3A1163	ProControl 1KS Installation
3A1164	ProControl 1KS Repair-Parts
312782	Dispense Valve
312783	Color Change Valve Stacks
312787	Color Change Module Kit
312784	Gun Flush Box Kits
310745	Gun Air Shutoff Kit
312786	Dump Valve and Third Purge Valve Kits
312785	Network Communication Kits
308778	G3000/G3000HR/G250/G250HR Flow Meter
313599	Coriolis Flow Meter
313212	Gun Flush Box Integration Kit
313290	Floor Stand Kit
313542	Beacon Kit
313386	Basic Web Interface/Advanced Web Interface
406800	15V825 Discrete I/O Board Kit

Equipment Approvals

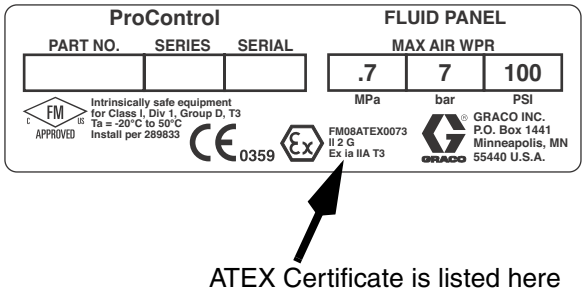
Equipment approvals appear on the following labels which are attached to the Fluid Station Control Box and EasyKey™. See FIG. 1 on page 4 for label locations.

EasyKey and Fluid Station Control Box Label

ATEX Certificate is listed here



Fluid Station Control Box Label



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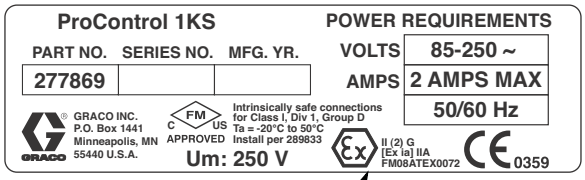
EasyKey Label



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System Configuration and Part Numbers

Models

The part number for your equipment is printed on the equipment identification labels. See FIG. 1 for location of the identification labels.							
			Meter			Flow Control	
Part No.	Series	Description	None	G3000	Coriolis	No	Yes
262380	A	ProControl 1KS	✔			✔	
262381	A	ProControl 1KS		✔		✔	
262382	A	ProControl 1KS		✔			✔
262383	A	ProControl 1KS			✔		✔

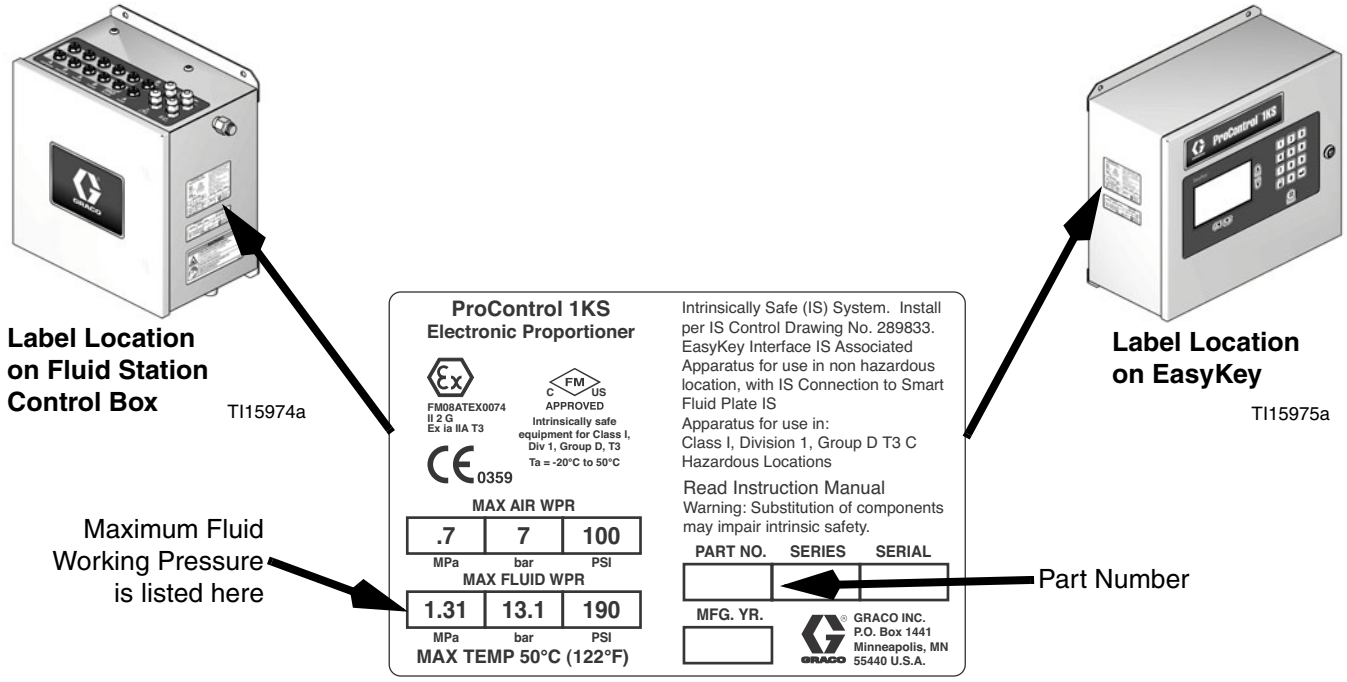


FIG. 1: Identification Label, ProControl 1KS Systems

Hazardous Location Approval

Models using a G3000, G3000HR, or intrinsically safe Coriolis meter are approved for installation in a Hazardous Location - Class I, Div I, Group D, T3 or Zone I Group IIA T3.

Maximum Working Pressure

Maximum working pressure rating is dependent on the fluid component options selected. ***The pressure rating is based on the rating of the lowest rated fluid component.*** Refer to the component pressure ratings below. *Example:* Model 262383 has a maximum working pressure of 190 psi (1.31 MPa, 13.1 bar).

Check the identification label on the EasyKey or fluid station for the system maximum working pressure. See FIG. 1.

ProMix Fluid Components Maximum Working Pressure

Base System (no meter, no color/catalyst change option, and no flow control [option)	4000 psi (27.58 MPa, 275.8 bar)
G3000 Meter Option	4000 psi (27.58 MPa, 275.8 bar)
Coriolis Meter Option	2300 psi (15.86 MPa, 158.6 bar)
Color Change Option	300 psi (2.07 MPa, 20.6 bar)
Flow Control Option	190 psi (1.31 MPa 13.1 bar)

Flow Meter Fluid Flow Rate Range

G3000	75-3800 cc/min. (0.02-1.0 gal./min.)
G3000HR	38-1900 cc/min. (0.01-0.50 gal./min.)
Coriolis Meter	20-3800 cc/min. (0.005-1.00 gal./min.)
S3000 Solvent Meter (accessory)	38-1900 cc/min. (0.01-0.50 gal./min.)

Standard Features

Feature
EasyKey with LCD
RS 485 Network Cable, 50 ft (15.25 m)
Fiber Optic and Power Cables, 50 ft (15.25 m)
Fluid Station Control Box
Discrete I/O Board
A Side Dump Valve, if color valve(s) selected
Flow Control with 15 ft (4.57 m) Cable (if selected)
Basic Web Interface

Accessories

Accessory
15V536 Solvent Flow Switch Kit
15V213 Power Cable, 100 ft (30.5 m)
15G710 Fiber Optic Cable, 100 ft (30.5 m)
15G614 Flow Control Extension Cable, 40 ft (12.2 m)
15W034 Strobe Light Alarm Indicator Kit
15V331 Gateway Ethernet Communication Kit
15V963 Gateway DeviceNet Communication Kit
15V964 Gateway Profibus Communication Kit
15V337 Advanced Web Interface

Warnings

The following warnings are for the setup, use, grounding, maintenance, and repair of this equipment. The exclamation point symbol alerts you to a general warning and the hazard symbols refer to procedure-specific risks. When these symbols appear in the body of this manual, refer back to these Warnings. Product-specific hazard symbols and warnings not covered in this section may appear throughout the body of this manual where applicable.

⚠ WARNING

FIRE AND EXPLOSION HAZARD

Flammable fumes, such as solvent and paint fumes, in **work area** can ignite or explode. To help prevent fire and explosion:

- Use equipment only in well ventilated area.
- Eliminate all ignition sources; such as pilot lights, cigarettes, portable electric lamps, and plastic drop cloths (potential static arc).
- Keep work area free of debris, including solvent, rags and gasoline.
- Do not plug or unplug power cords, or turn power or light switches on or off when flammable fumes are present.
- Ground all equipment in the work area. See **Grounding** instructions.
- Use only grounded hoses.
- Hold gun firmly to side of grounded pail when triggering into pail.
- If there is static sparking or you feel a shock, **stop operation immediately.** Do not use equipment until you identify and correct the problem.
- Keep a working fire extinguisher in the work area.

ELECTRIC SHOCK HAZARD

This equipment must be grounded. Improper grounding, setup, or usage of the system can cause electric shock.

- Turn off and disconnect power at main switch before disconnecting any cables and before servicing equipment.
- Connect only to grounded power source.
- All electrical wiring must be done by a qualified electrician and comply with all local codes and regulations.

INTRINSIC SAFETY

Intrinsically safe equipment that is installed improperly or connected to non-intrinsically safe equipment will create a hazardous condition and can cause fire, explosion, or electric shock. Follow local regulations and the following safety requirements.

- Only models with a G3000, G250, G3000HR, G250HR, or intrinsically safe Coriolis meter are approved for installation in a Hazardous Location - Class I, Div I, Group D, T3 or Zone I Group IIA T3.
- Do not install equipment approved only for a non-hazardous location in a hazardous area. See the ID label for the intrinsic safety rating of your model.
- Do not substitute or modify system components as this may impair intrinsic safety.

WARNING

SKIN INJECTION HAZARD

High-pressure fluid from gun, hose leaks, or ruptured components will pierce skin. This may look like just a cut, but it is a serious injury that can result in amputation. **Get immediate surgical treatment.**

- Do not spray without tip guard and trigger guard installed.
- Engage trigger lock when not spraying.
- Do not point gun at anyone or at any part of the body.
- Do not put your hand over the spray tip.
- Do not stop or deflect leaks with your hand, body, glove, or rag.
- Follow the **Pressure Relief Procedure** when you stop spraying and before cleaning, checking, or servicing equipment.
- Tighten all fluid connections before operating the equipment.
- Check hoses and couplings daily. Replace worn or damaged parts immediately.

EQUIPMENT MISUSE HAZARD

Misuse can cause death or serious injury.

- Do not operate the unit when fatigued or under the influence of drugs or alcohol.
- Do not exceed the maximum working pressure or temperature rating of the lowest rated system component. See **Technical Data** in all equipment manuals.
- Use fluids and solvents that are compatible with equipment wetted parts. See **Technical Data** in all equipment manuals. Read fluid and solvent manufacturer's warnings. For complete information about your material, request MSDS from distributor or retailer.
- Do not leave the work area while equipment is energized or under pressure. Turn off all equipment and follow the **Pressure Relief Procedure** when equipment is not in use.
- Check equipment daily. Repair or replace worn or damaged parts immediately with genuine manufacturer's replacement parts only.
- Do not alter or modify equipment.
- Use equipment only for its intended purpose. Call your distributor for information.
- Route hoses and cables away from traffic areas, sharp edges, moving parts, and hot surfaces.
- Do not kink or over bend hoses or use hoses to pull equipment.
- Keep children and animals away from work area.
- Comply with all applicable safety regulations.

WARNING

TOXIC FLUID OR FUMES HAZARD

Toxic fluids or fumes can cause serious injury or death if splashed in the eyes or on skin, inhaled, or swallowed.

- Read MSDSs to know the specific hazards of the fluids you are using.
- Store hazardous fluid in approved containers, and dispose of it according to applicable guidelines.
- Always wear chemically impermeable gloves when spraying, dispensing, or cleaning equipment.

PERSONAL PROTECTIVE EQUIPMENT

You must wear appropriate protective equipment when operating, servicing, or when in the operating area of the equipment to help protect you from serious injury, including eye injury, hearing loss, inhalation of toxic fumes, and burns. This equipment includes but is not limited to:

- Protective eyewear, and hearing protection.
- Respirators, protective clothing, and gloves as recommended by the fluid and solvent manufacturer.

Important Two-Component Material Information

Isocyanate Conditions

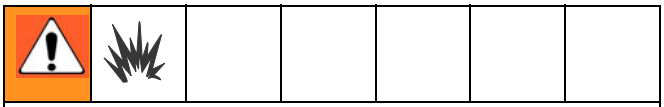
Spraying or dispensing materials containing isocyanates creates potentially harmful mists, vapors, and atomized particulates.

Read material manufacturer's warnings and material MSDS to know specific hazards and precautions related to isocyanates.

Prevent inhalation of isocyanate mists, vapors, and atomized particulates by providing sufficient ventilation in the work area. If sufficient ventilation is not available, a supplied-air respirator is required for everyone in the work area.

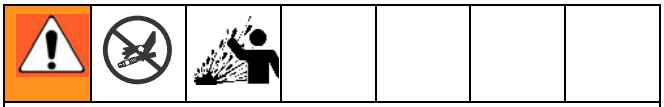
To prevent contact with isocyanates, appropriate personal protective equipment, including chemically impermeable gloves, boots, aprons, and goggles, is also required for everyone in the work area.

Material Self-ignition



Some materials may become self-igniting if applied too thickly. Read material manufacturer's warnings and material MSDS.

Keep Components A and B Separate



Cross-contamination can result in cured material in fluid lines which could cause serious injury or damage equipment. To prevent cross-contamination of the equipment's wetted parts, **never** interchange component A (isocyanate) and component B (resin) parts.

Moisture Sensitivity of Isocyanates

Isocyanates (ISO) are catalysts used in two component coatings. ISO will react with moisture (such as humidity) to form small, hard, abrasive crystals, which become suspended in the fluid. Eventually a film will form on the surface and the ISO will begin to gel, increasing in viscosity. If used, this partially cured ISO will reduce performance and the life of all wetted parts.

NOTE: The amount of film formation and rate of crystallization varies depending on the blend of ISO, the humidity, and the temperature.

To prevent exposing ISO to moisture:

- Always use a sealed container with a desiccant dryer in the vent, or a nitrogen atmosphere. **Never** store ISO in an open container.
- Use moisture-proof hoses specifically designed for ISO, such as those supplied with your system.
- Never use reclaimed solvents, which may contain moisture. Always keep solvent containers closed when not in use.
- Never use solvent on one side if it has been contaminated from the other side.
- Always lubricate threaded parts with ISO pump oil or grease when reassembling.

Changing Materials

- When changing materials, flush the equipment multiple times to ensure it is thoroughly clean.
- Always clean the fluid inlet strainers after flushing.
- Check with your material manufacturer for chemical compatibility.
- Most materials use ISO on the A side, but some use ISO on the B side.

Glossary of Terms

Air Chop - the process of mixing air and solvent together during the flush cycle to help clean the lines and reduce solvent usage.

Analog - relating to, or being a device in which data are represented by continuously variable, measurable, physical quantities, such as length, width, voltage, or pressure.

Closed Loop Flow Control - refers to the process when the flow rate is adjusted automatically to maintain a constant flow.

Color/Catalyst Dump - refers to the time required to flush the lines from the color or catalyst change module to the mix manifold during a color or catalyst change.

Color/Catalyst Fill - refers to the time required to fill the lines from the color or catalyst change module to the mix manifold.

Coriolis Meter - a non-intrusive flow meter often used in low flow applications or with light viscosity, shear sensitive, or acid catalyzed materials. This meter uses vibration to measure flow.

Digital Input and Output - a description of data which is transmitted as a sequence of discrete symbols, most commonly this means binary data represented using electronic or electromagnetic signals.

Discrete I/O - refers to data that constitutes a separate entity and has direct communication to another control.

Dose Size - the amount of resin (A) and catalyst (B) that is dispensed into an integrator (in ProMix 2KS applications).

Dose Time Alarm - the amount of time that is allowed for a dose to occur before an alarm occurs.

Ethernet - a method for directly connecting a computer to a network or equipment in the same physical location.

Fiber Optic Communication - the use of light to transmit communication signals.

Fill Time - the amount of time that is required to load mix material to the applicator.

Flow Control Resolution - a settable value that allows the flow control system to maximize its performance. The value is based on maximum desired flow rates.

Flow Rate Analog Signal - the type of communication signal that can be used on the ProControl module.

Flow Rate Tolerance - the settable percent of acceptable variance that the system will allow before a flow rate warning occurs.

Flow Set Point - a predefined flow rate target.

Grand Total - a non-resettable value that shows the total amount of material dispensed through the system.

Gun Trigger Input Signal - used to manage ratio assurance dose times and flow control processes.

Intrinsically Safe (IS) - refers to the ability to locate certain components in a hazardous location.

Idle - if the gun is not triggered for 2 minutes the system enters Idle mode. Trigger the gun to resume operation.

Job Total - a resettable value that shows the amount of material dispensed through the system for one job. A job is complete when a color change or complete system flush occurs.

K-factor - a value that refers to the amount of material that passes through a meter. The assigned value refers to an amount of material per pulse.

Ki - refers to the degree fluid flow over shoots its set point.

Kp - refers to the speed in which the fluid flow reaches its set point.

Manual Mode - when the proportioning or flow control system is controlling the inputs without any input from an outside control.

Mix - when cross-linking of the resin (A) and catalyst (B) occurs (in ProMix 2KS applications). In ProControl 1KS applications, indicates the system is active.

Mix Input Signal- refers to system mode status where system begins a dose sequence each time the mix signal is made “High”.

Modbus/TCP - a type of communication protocol used to communicate Digital I/O signals over an ethernet.

Network Station - a means to identify a particular individual proportioning or flow control system.

Overdose Alarm - when either the resin (A) or catalyst (B) component dispenses too much material and the system cannot compensate for the additional material.

Potlife Time - the amount of time before a material becomes unsprayable.

Potlife Volume - the amount of material that is required to move through the mix manifold, hose and applicator before the potlife timer is reset.

Purge - when all mixed material is flushed from the system.

Purge Time - the amount of time required to flush all mixed material from the system.

Ratio Tolerance - the settable percent of acceptable variance that the system will allow before a ratio alarm occurs.

Sequential Color Change - the process when a color change is initiated and the system automatically flushes the old color and loads a new color.

Solvent Fill - the time required to fill the mixed material line with solvent.

Standby - refers to the status of the system.

Third Purge Valve - refers to the use of three purge valves used to flush some waterborne materials. The valves are used to flush with water, air and solvent.

V/P - refers to the voltage to air pressure device in the flow control module.

Overview

Usage

The Graco ProControl 1KS is an electronic flow control and color change system, for use with most solvent and waterborne epoxy, polyurethane, and acid-catalyzed paints. It is not for use with “quick-setting” paints (those with a potlife of less than 15 minutes).

- Has user selectable ratio assurance and can maintain up to +/-1% accuracy, depending on materials and operating conditions.
- Models are available to operate air spray or air-assisted systems with a capacity of up to 3800 cc/min.
- Color change options are available for low pressure (300 psi [2.1 MPa, 21 bar]) air spray and high pressure (3000 psi [21 MPa, 210 bar]) systems with up to 30 color change valves and up to 4 catalyst change valves.

  NOTE: Optional accessories are available for in field installation to achieve 30 colors.

Component Identification and Definition

SeeTable 1 and FIG. 2 for the system components.

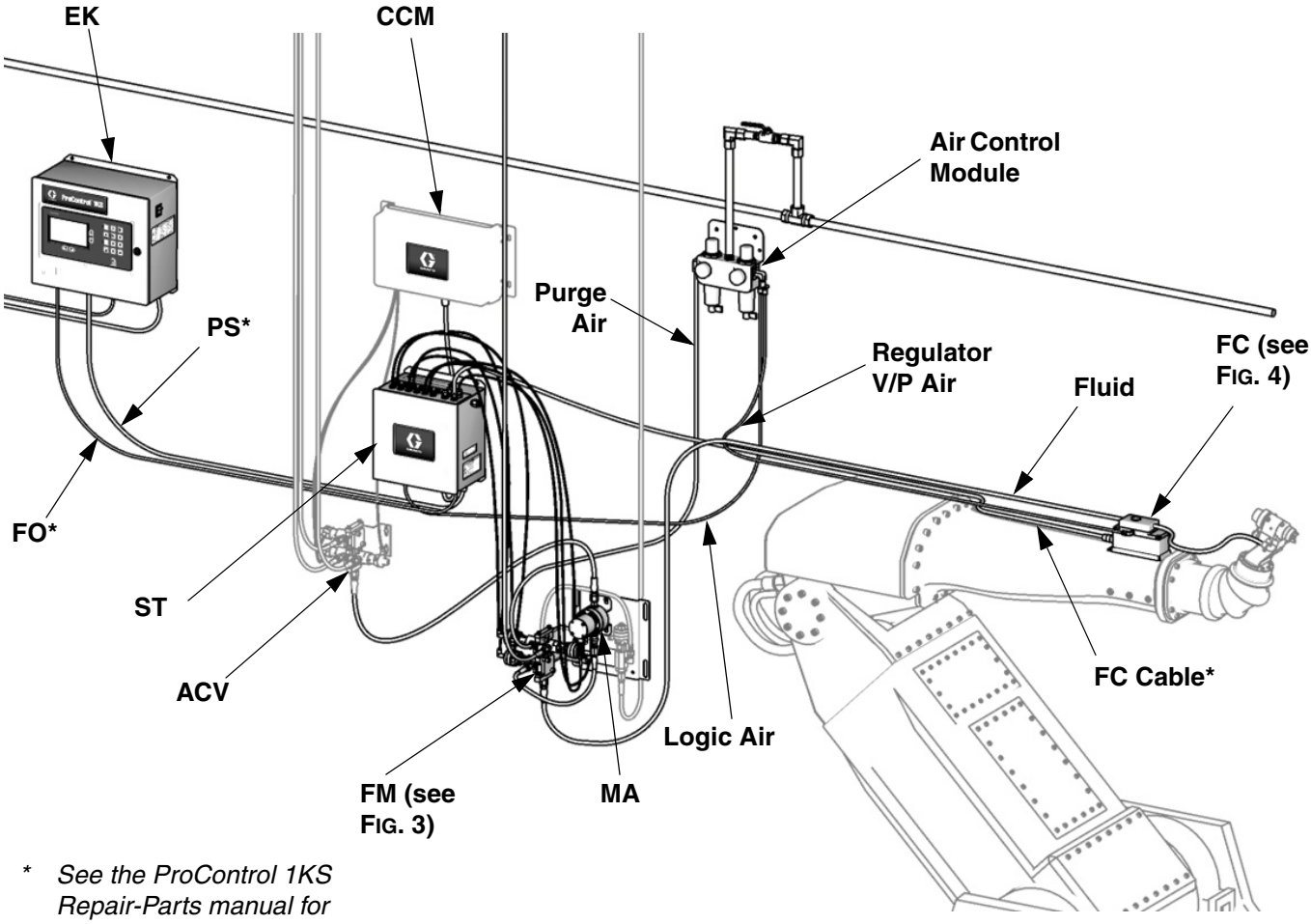
Table 1: Component Descriptions

Component	Description
EasyKey (EK)	Used to set up, display, operate, and monitor the system. The EasyKey accepts 85-250 VAC, 50/60 Hz line power and converts that power to acceptable low voltage and optical signals used by other system components.
Fluid Station Control Box (ST)	Includes air control solenoids. Its control board manages all fluid functions.
Fluid Manifold (FM)	Includes wall mounting bracket and mountings for the fluid meter and the following valves: • **Pneumatically Operated Dose Valve** for component A • **Purge Valves** for solvent and air purge
Flow Meters (MA, MS)	Four optional flow meters are available from Graco: • **G3000** is a general purpose gear meter typically used in flow ranges of 75-3800 cc/min. (0.02–1.0 gal/min.), pressures up to 4000 psi (28 MPa, 276 bar), and viscosities of 20–3000 centipoise. The K-factor is approximately 0.119 cc/pulse. • **G3000HR** is a high resolution version of the G3000 meter. It is typically used in flow ranges of 38–1900 cc/min. (0.01–0.5 gal/min.), pressures up to 4000 psi (28 MPa, 276 bar). and viscosities of 20–3000 centipoise. The K-factor is approximately 0.061 cc/pulse. • **S3000** is a gear meter used for solvents in flow ranges of 38-1900 cc/min. (0.01–0.50 gal/min.), pressures up to 3000 psi (21 MPa, 210 bar), and viscosities of 20–50 centipoise. The K-factor is approximately 0.021 cc/pulse. • **Coriolis** is a specialty meter capable of a wide range of flow rates and viscosities. This meter is available with 1/8 in. or 3/8 in. diameter fluid passages. For detailed information on the Coriolis meter, see manual 313599. The K-factor is user-settable; at lower flow rates use a lower K-factor. ➜ 1/8 in. fluid passages: set K-factor to .020 or .061. ➜ 3/8 in. fluid passages: set K-factor to .061 or 0.119.

Table 1: Component Descriptions

Component	Description
Color Change Valves (ACV) and Color Change Module (CCM)	An optional component. It is available as a color change valve stack for either low or high pressure with up to 30 color change valves. Each stack includes one additional valve for solvent to clean the fluid line between color changes.
Dual Fiber Optic Cable (FO)	Used to communicate between the EasyKey and Fluid Station Control Box.
Fluid Station Control Box Power Supply Cable (PS)	Used to provide power to the Fluid Station Control Box.
Flow Control Regulator Assembly (FC)	Includes an air operated fluid pressure regulator, fluid pressure sensor, voltage to air pressure transducer and circuit board. The function of this unit is to receive the flow analog signal and drive (manage) the desired flow rate.

ProControl 1KS System Components



* *See the ProControl 1KS Repair-Parts manual for optional cable lengths.*

FIG. 2. ProControl 1KS System, shown with G3000 Meter, Color Change, and Flow Control

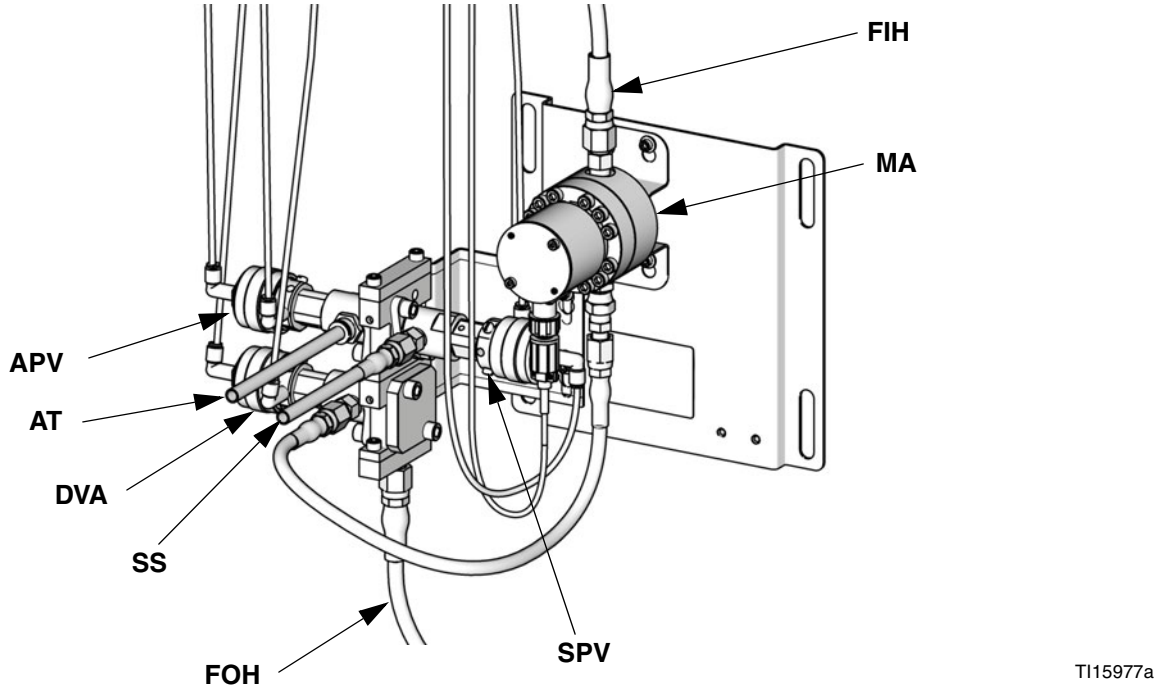


FIG. 3. Fluid Manifold

Key:

MA	Component A Meter	APV	Air Purge Valve
DVA	Component A Dose Valve	AT	Air Purge Valve Air Supply Tube
SPV	Solvent Purge Valve	FIH	Fluid Inlet Hose
SS	Solvent Purge Valve Solvent Supply Tube	FOH	Fluid Outlet Hose

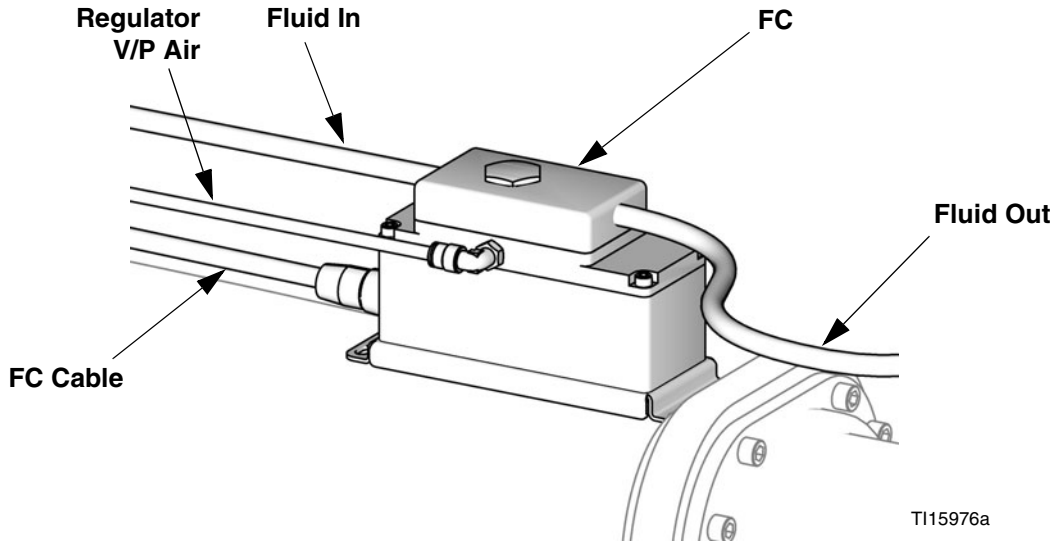


FIG. 4. Flow Control Regulator

EasyKey Display and Keyboard

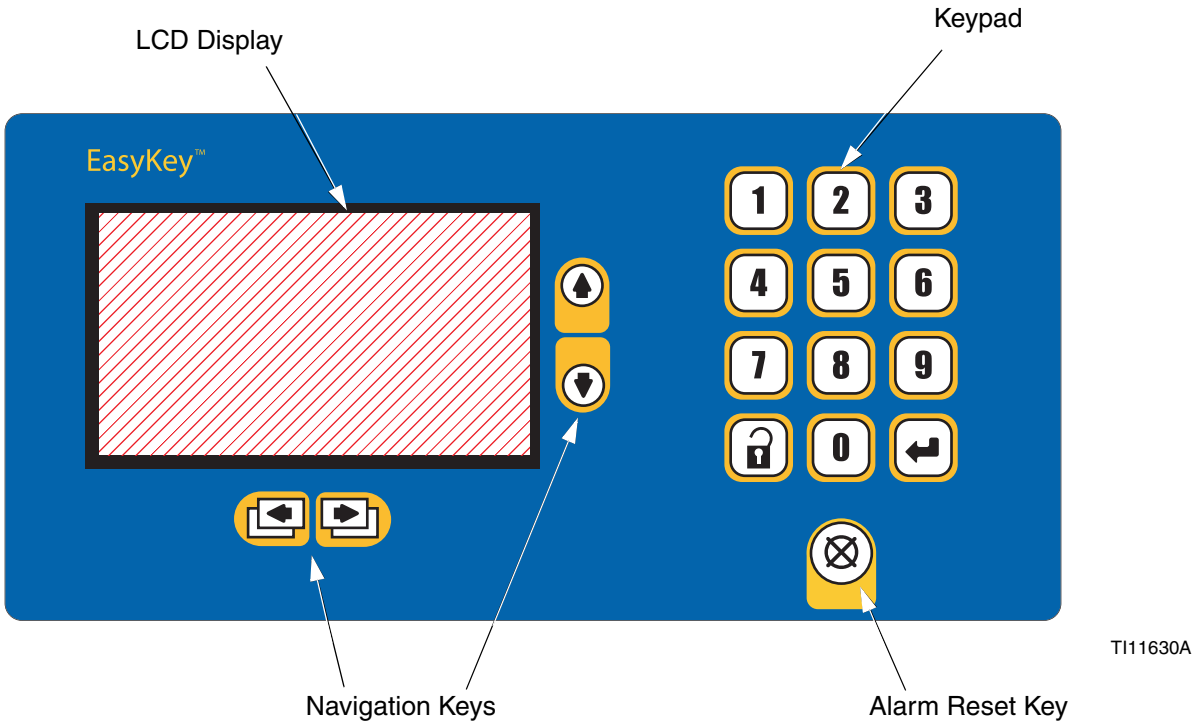


FIG. 5. EasyKey Display and Keypad

Display

Shows graphical and text information related to setup and spray operations. Back light will turn off after 10 minutes without any key press. Press any key to turn back on.

Keypad

Used to input numerical data, enter setup screens, scroll through screens, and select setup values.

In addition to the numbered keys on the EasyKey keypad, which are used to enter values in setup, there are keys to navigate within a screen and between screens, and to save entered values. See Table 2.

Table 2: EasyKey Keypad Functions (see FIG. 5)

Key	Function
	Setup: press to enter or exit Setup mode.
	Enter: if cursor is in menu box, press Enter key to view menu. Press Enter to save a value either keyed in from the numerical keypad or selected from a menu.
	Up Arrow: move to previous field or menu item, or to previous screen within a group.
	Down Arrow: move to next field or menu item, or to next screen within a group.
	Left Arrow: move to previous screen group.
	Right Arrow: move to next screen group.
	Alarm Reset: resets alarms.

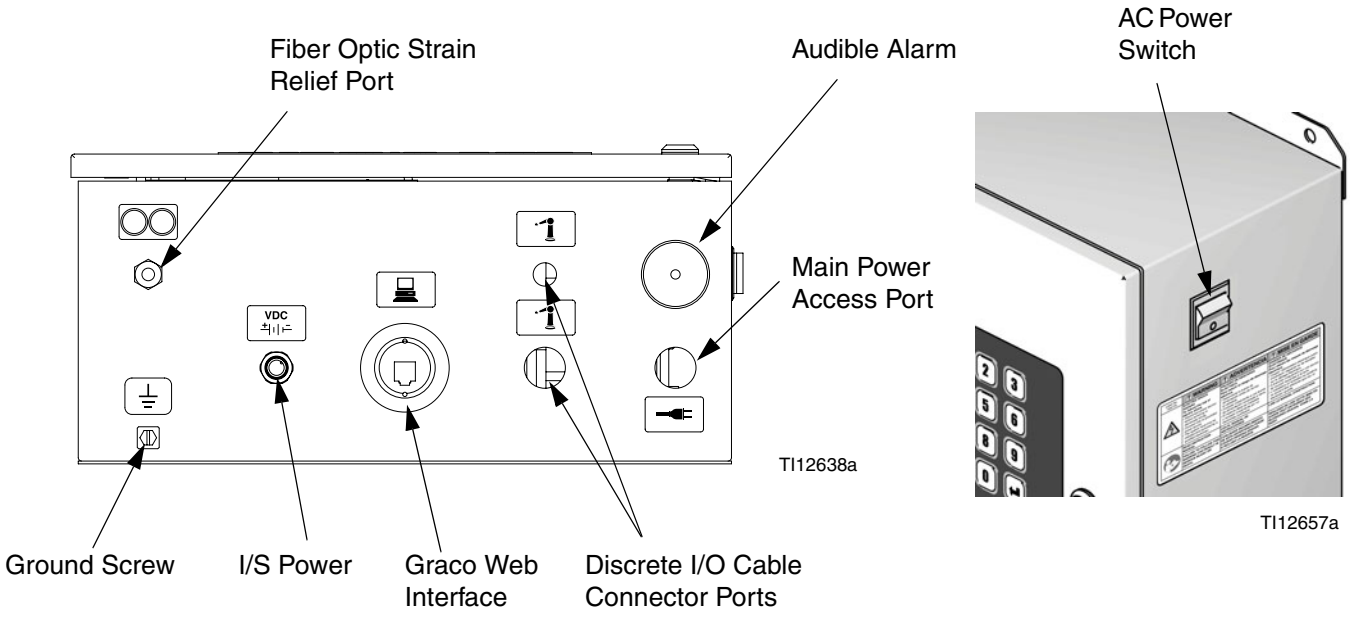


FIG. 6. EasyKey Connections and AC Power Switch

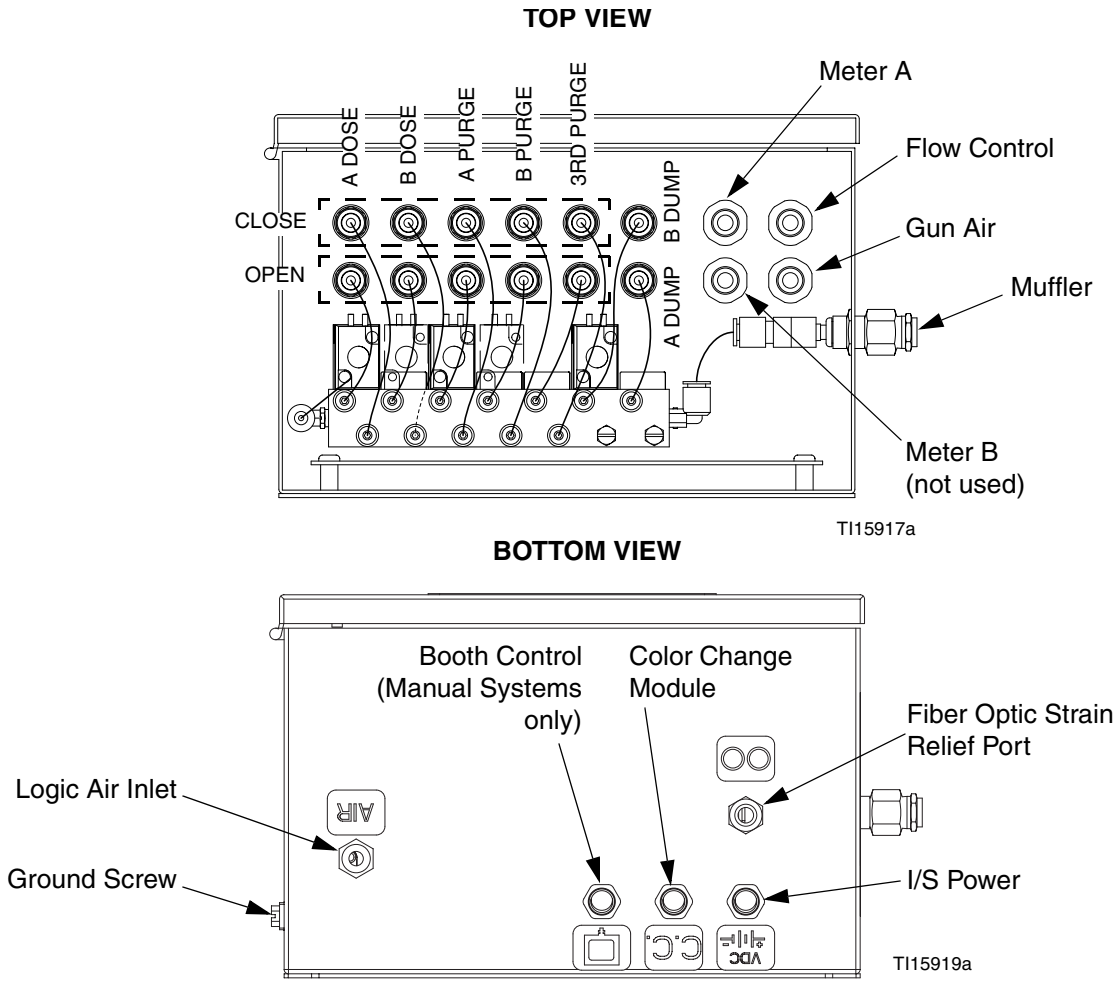


FIG. 7. Fluid Station Control Box Connections

AC Power Switch

Turns system AC power on or off.

I/S Power

Power circuit to Fluid Station Control Box.

Potlife Exceeded Audible Alarm

Alerts the user when a Potlife Exceeded alarm occurs.

Clear by pressing the Alarm Reset key.

Graco Web Interface Port

Used to communicate with the ProMix from a PC to:

- ➜ Upgrade software
- ➜ View software version
- ➜ Download
  - Job and alarm logs
  - Material usage report
  - Setup values (can also upload)
- ➜ Clear job, alarm, and material usage reports
- ➜ Upload a custom language to view on screen
- ➜ Restore factory defaults
- ➜ Restore setup password

See manual 313386 for more information.

NOTE: If using the Graco Gateway in your system, disconnect its cable from the EasyKey before updating the ProMix 2KS/ProControl 1KS software.

Ethernet Connection

You can access data on an office or industrial network through the internet with the proper configuration. See manual 313386 for more information.

Run Mode Screens

NOTE: See FIG. 10 for a map of the Run screens. Detailed screen descriptions follow.

Splash Screen

At power up, the Graco logo and software revision will display for approximately 5 seconds, followed by the **Status Screen** (see page 21).

FIG. 8. Splash Screen

The Splash screen will also momentarily display “Establishing Communication.” If this display remains for more than one minute, check that the fluid station control box circuit board is powered up (LED is on) and that the fiber optic cable is properly connected (see Installation manual).

NOTE: If the software version of the fluid plate does not match the version of the EasyKey, the EasyKey will update the fluid plate, and the fluid plate programming screen will appear until the update is completed.

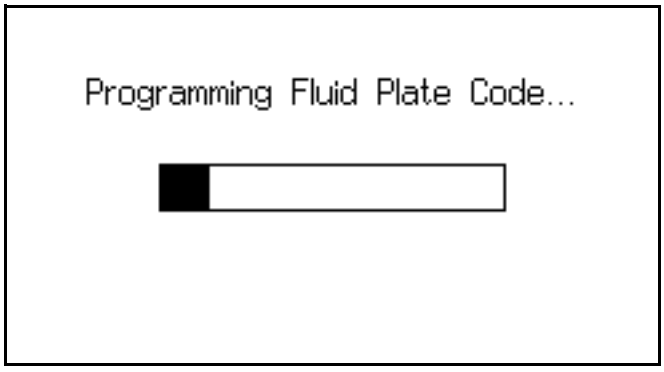


FIG. 9. Fluid Plate Programming Screen

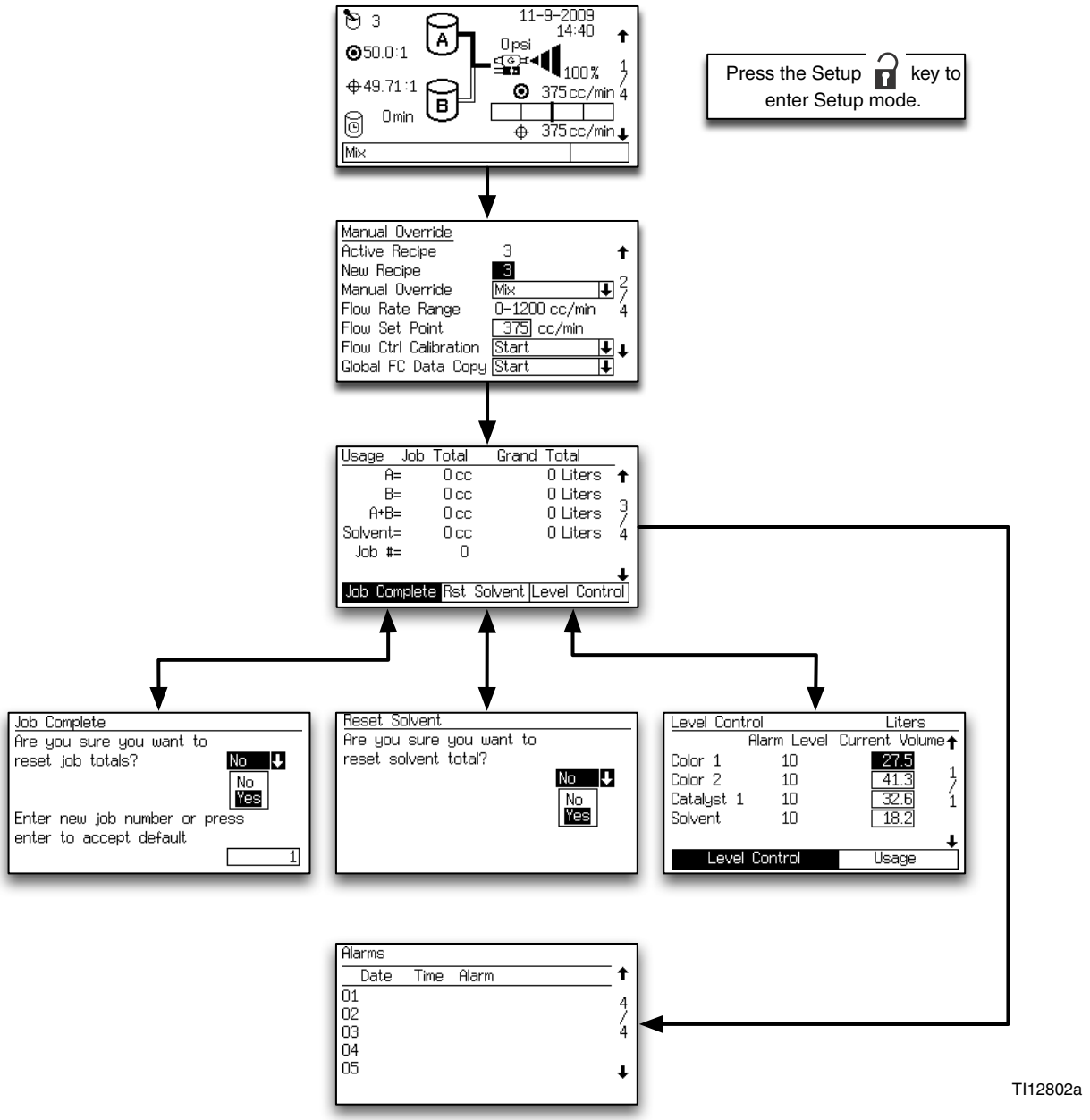


FIG. 10. Run Screens Map

Status Screen

- Use the Up ▲ or Down ▼ keys to scroll through the Run screens.
- Press the Enter ↵ key to select a different fluid station control box.
- Press the Setup key to enter the Setup screens from the Status screen.
- The other keys have no function in this Status screen.

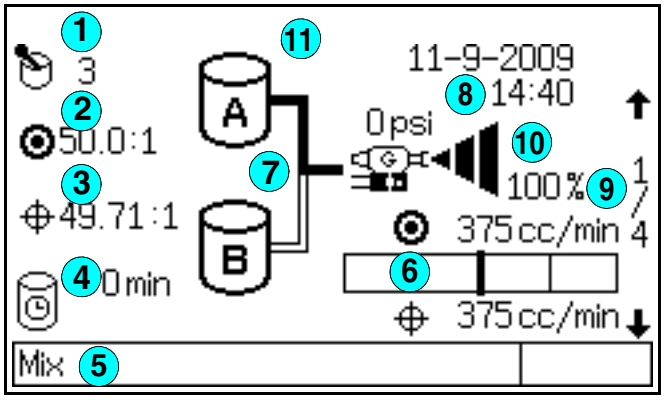


FIG. 11. Status Screen

Key to FIG. 11:

(1) **Active Recipe:** shows the active recipe.

NOTE: At power up the system defaults to Recipe 61, which is not a valid recipe number.

(2) **Target Ratio:** for the active recipe. The ratio can be from 0.0:1–50.0:1, in 0.1 increments. For the Pro-Control 1KS, set the ratio at 0:1.

(3) **Actual Ratio:** in hundredths, calculated after each dose of A.

(4) **Potlife Timer:** shows remaining potlife time in minutes. Two times are shown if there are two guns (manual or semi-automatic mode only).

(5) **Status Bar:** shows current alarm or operation mode (standby, mix, purge, recipe change, or the current alarm).

NOTE: If the auto key board is removed from the EasyKey display board, the Status Bar will read "Auto key not found." This indicates that the automatic mode is not operable.

(6) **Target Flow Rate and Current Flow Rate:** in cc/min.

(7) **Animation:** when the gun is triggered, the gun appears to spray and the component A or B hose lights up, showing which component dose valve is open.

(8) **Current Date and Time**

(9) **Screen Number and Scroll Arrows:** displays the current screen number and the total number of screens in a group. The Up and Down arrows on the right edge of the screen indicate the scroll feature. The total number of screens in some groups may vary depending on system configuration selections.

(10) **Current Flow Control Data:** fluid output pressure and percentage of analog signal range used for driving the fluid regulator V/P.

(11) **Lock Symbol:** indicates that Setup screens are password protected. See page 26.

Manual Override Screen

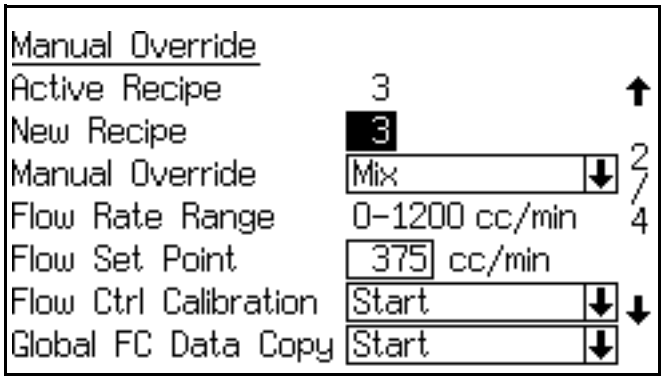


FIG. 12. Manual Override Screen

This screen will appear if Manual Override is set to “On” in **Advanced Setup Screen 1** (page 35). It shows the active recipe, new/go to recipe, and manual override mode.

If Flow Control is set to “On” in **Configure Screen 5** on page 31, this screen will also display Flow Rate Range, Flow Set Point, Flow Control Calibration (Start/Abort), and Global Flow Control Data Copy (Start/Abort).

Manual Override Menu

This field allows you to set the operating mode from the EasyKey. Press the Enter key to view the menu, then select the desired operating mode (Standby, Mix, Purge, or Recipe Change). See FIG. 13.

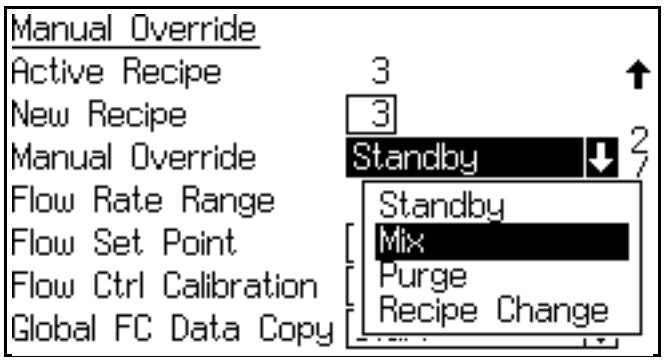


FIG. 13. Manual Override Menu

Flow Rate Range

This screen displays the flow rate range selected on **Advanced Setup Screen 5** (see page 37).

Flow Set Point

The Flow Set Point is user settable. If Flow Control Override is set to “Off” or “Pressure” in **Advanced Setup Screen 1** on page 35, the Flow Set Point will display as cc/min. Enter the desired flow set point within the range.

If Flow Control Override is set to “% Open,” the Flow Set Point will display as % Open. This percentage relates to the flow control V/P ratio which translates to a fluid flow rate. Set the initial percentage at 35% and increase as necessary to reach the desired flow rate.

Flow Control Calibration

This field allows you to calibrate flow control for each recipe. The system must be in Mix mode and receiving a Gun Trigger signal. Press the Enter key to view the menu, then select Start or Abort. See FIG. 14.

The flow rate will drop to 0, then incrementally increase until it reaches the maximum flow rate. To view the progress, go to the **Status Screen**, page 21. The system will populate the data for the current recipe. To copy this data to all recipes, see **Global Flow Control Data Copy**, page 23.

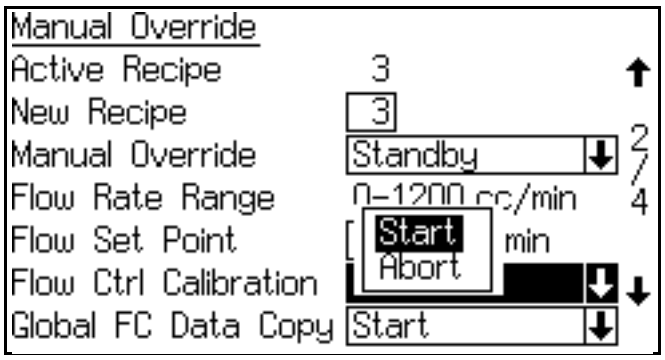


FIG. 14. Flow Control Calibration

Global Flow Control Data Copy

This field allows you to copy flow control data from the active recipe to all recipes. Press the Enter ↵ key to view the menu, then select Start or Abort. See FIG. 15.

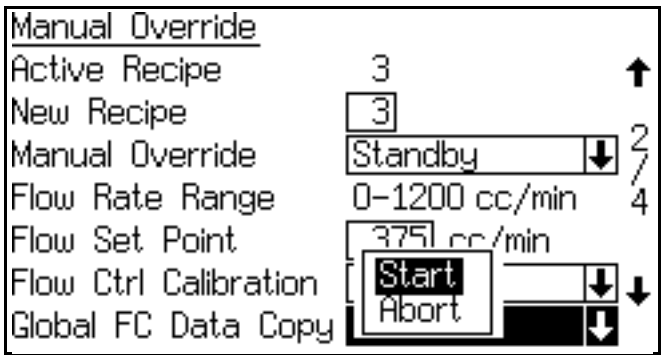


FIG. 15. Global FC Data Copy

Totals Screen

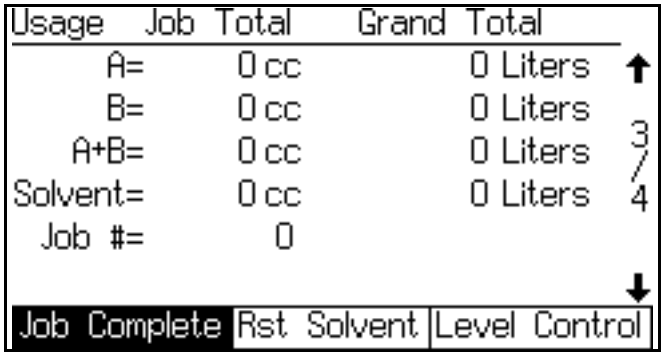


FIG. 16. Totals Screen

This screen shows the job totals, grand totals, and job number. Use the tabs to reset job totals (Job Complete), reset solvent totals (Rst Solvent), or go to **Level Control Screen**, page 24.

Solvent Totals and the Rst Solvent tab only appear if "Meter" is selected under Solvent Monitor in **Configure Screen 5** on page 31.

NOTE: Grand totals are not resettable.

Reset Total Screen

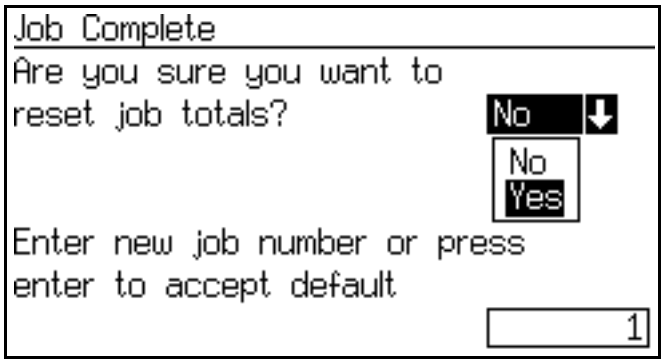


FIG. 17. Reset Total Screen

If job is reset, job number will increment by one for default.

Reset Solvent Screen

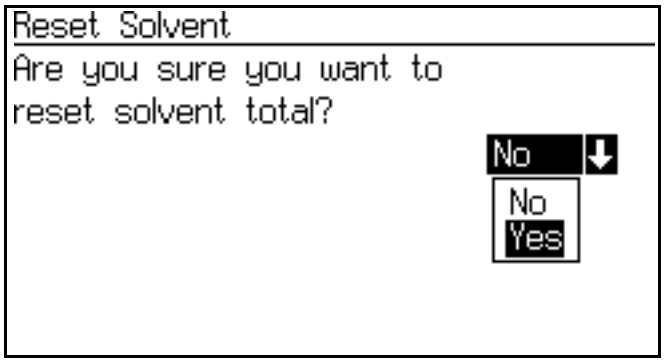


FIG. 18. Reset Solvent Total Screen

The screen will ask if you want to reset solvent total. Select Yes or No.

Alarms Screen

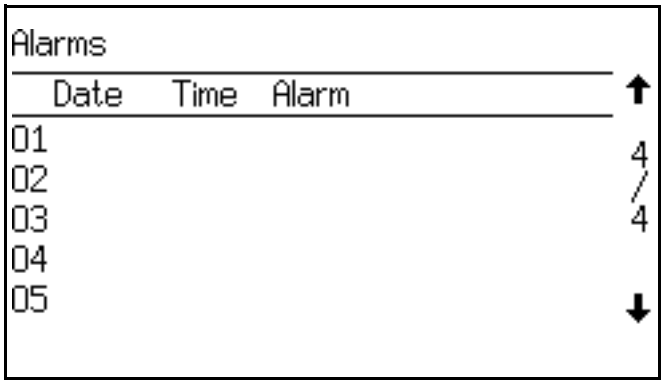


FIG. 19. Alarms Screen

Two screens show the last 10 alarms. Use the Up ▲ or Down ▼ keys to scroll between the two screens.

See Table 13 on page 90 for a list of alarm codes.

Level Control Screen

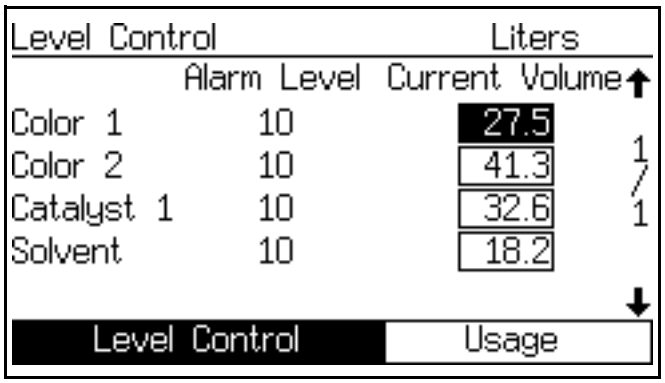


FIG. 20. Level Control Screen

This screen shows the current volume for each fluid. Adjust the actual volumes on this screen, or use the tab to go to Usage (**Totals Screen**, page 23).

See FIG. 21. If the tank volume reaches the low-level threshold, the EasyKey screen will display the Tank Level Low alarm and prompt the user to do one of the following:

1. Refill tank volume to clear the alarm.
2. Resume mixing by selecting “Spray 25% of Remainder.” If this selection is chosen, a second alarm will occur after 25% of the remaining volume is mixed. Refill tank volume to clear the alarm.

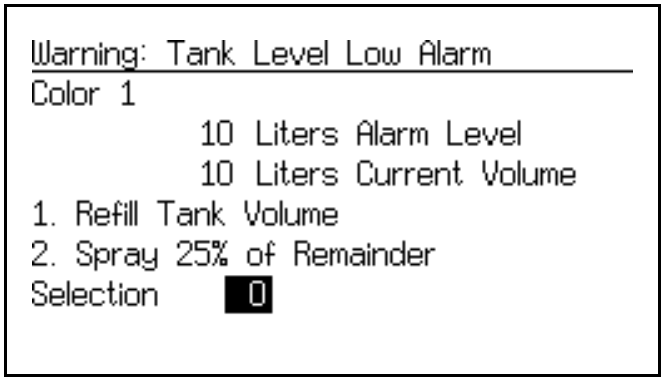


FIG. 21. Tank Level Low Screen (Tank A Shown)

Setup Mode

Press the Setup key to enter Setup mode.

NOTE: See FIG. 22 for a map of the Setup screens. Detailed screen descriptions follow.

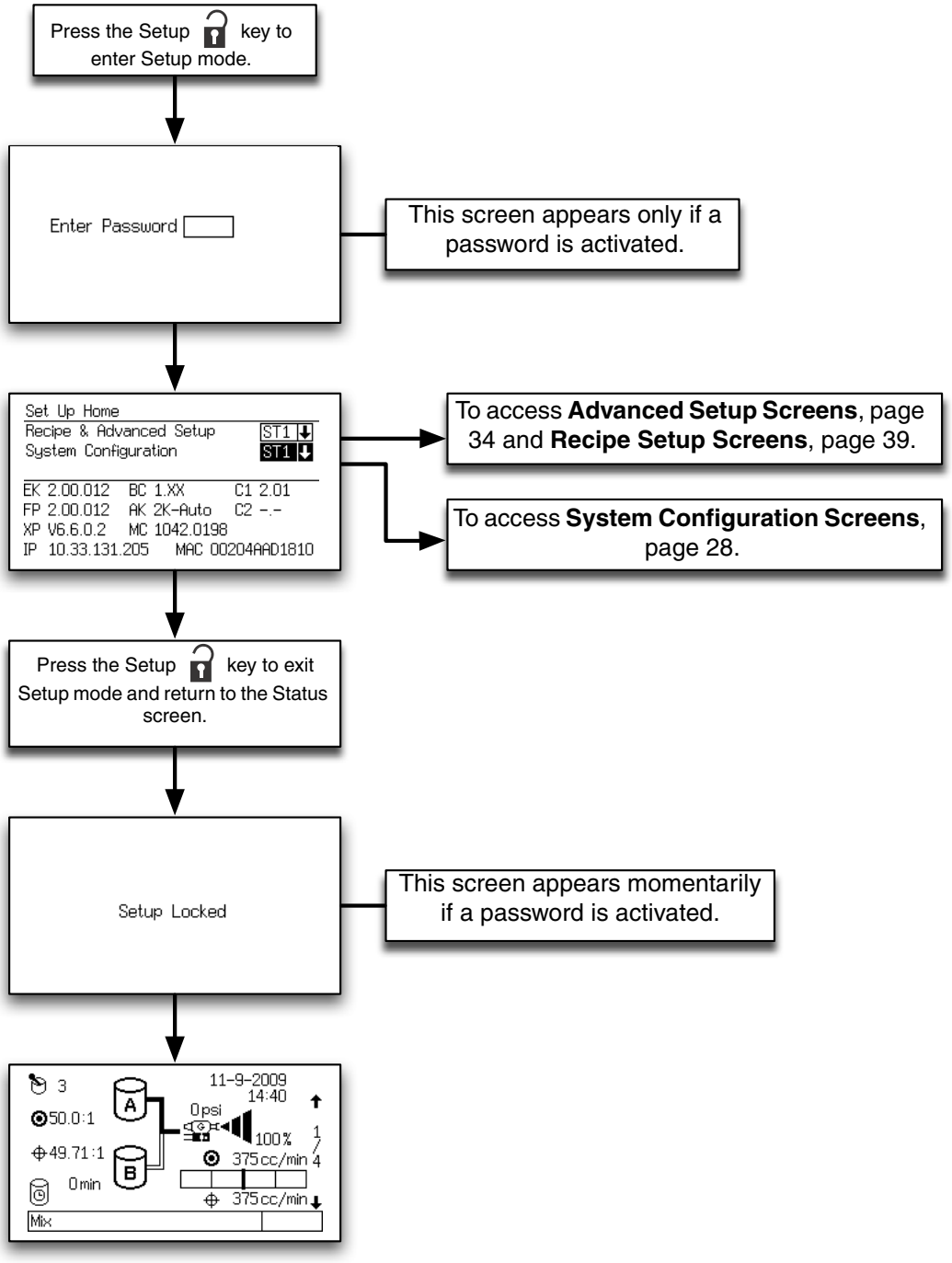


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FIG. 22. Setup Screens Map

Password Screen

If a password has been activated (see **Configure Screen 1**, page 29), the Password screen will appear. You must enter the password to access the **Set Up Home Screen**. Entering the wrong password returns the display to the **Status Screen**.

NOTE: If you forget the password, you can reset the password (to 0), using the ProMix Web Interface (see manual 313386).

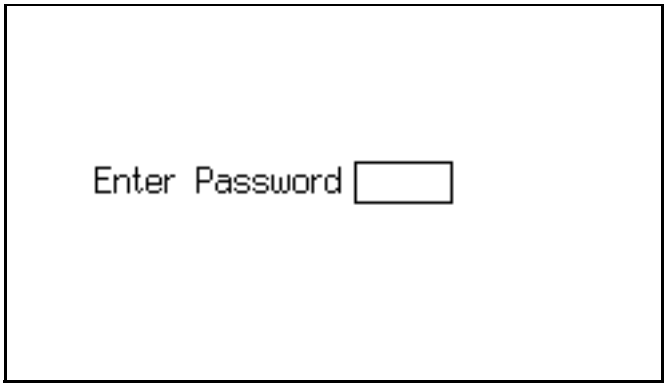


FIG. 23. Password Screen

NOTE: If a password is activated, **Setup Locked** displays momentarily after exiting Setup mode and returning to the **Status Screen**. A lock symbol appears on the **Status Screen**.

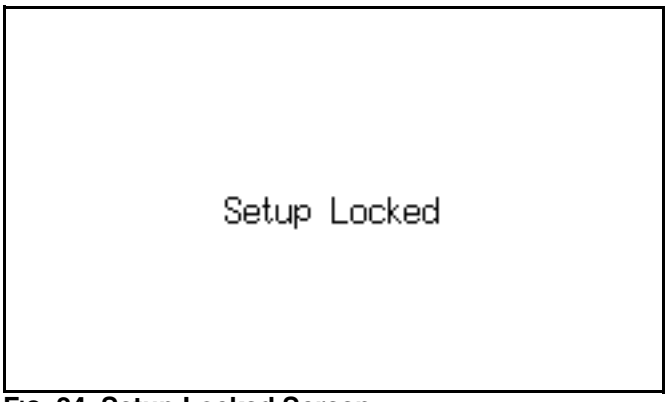


FIG. 24. Setup Locked Screen

Set Up Home Screen

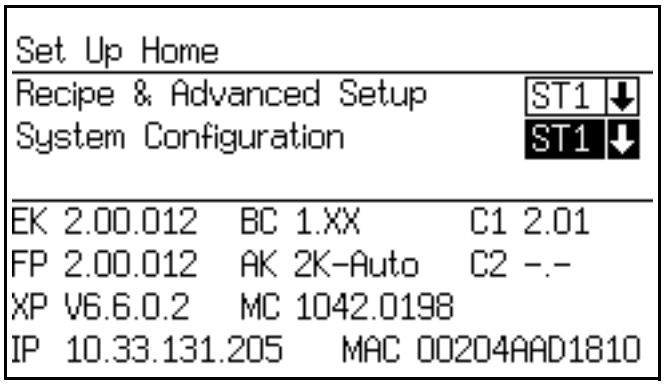


FIG. 25. Set Up Home Screen

This screen displays when you enter Setup mode. From it you can go to **Recipe and Advanced Setup Screens** (pages 34-42) or **System Configuration Screens** (pages 28-33). Press the Enter key to go to the selected screen set.

The screen also displays software versions and internet addresses of various components. The values shown in FIG. 25 are only examples and may vary on your screen. See Table 3 for further information.

Table 3: Component Software Versions

Component	Display (may vary from examples shown)	Description
EK (EasyKey)	2.00.012	EasyKey software version.
FP (Fluid Plate)	2.00.012	Fluid Plate software version.
BC (Booth Control)	-.-	Booth Control not installed, not detected, or not operational.
	1.XX	Booth Control software version 1.00 or 1.01.
	2.XX	Booth Control software version 2.XX.
C1/C2 (Color Change Modules 1 and 2)	-.-	Color Change Module 1/2 not installed, not detected, or not operational.
	1.XX	Color Change Module software version 1.00 or 1.01.
	2.XX	Color Change Module software version 2.XX.
AK (Autokey)	2K-Manual	No AutoKey installed or detected. System operates in 2K Manual Mode only
	2K-Auto	2K AutoKey detected. System can operate in 2K Manual, Semi-automatic, or Automatic Mode.
	3K-Auto	3K AutoKey detected. System can operate in 3K Manual, Semi-automatic, or Automatic Mode.
XP (XPORT)	V6.6.0.2	Example of XPORT network module software version. Other versions are acceptable.
MC (Micro Controller)	1042.0198	Example of fluid plate micro controller version. Other versions are acceptable.
IP (Internet Address)	192.168.178.5	Example of the address EasyKey is set to for basic and advanced web interface reporting.
MAC (MAC address)	00204AAD1810	Example of internet MAC address. Each EasyKey will have a different value in this format.

System Configuration Screens

NOTE: See FIG. 26 for a map of the **System Configuration Screens**. Detailed screen descriptions follow.

NOTE: Each screen displays the current screen number and the total number of screens in the group.

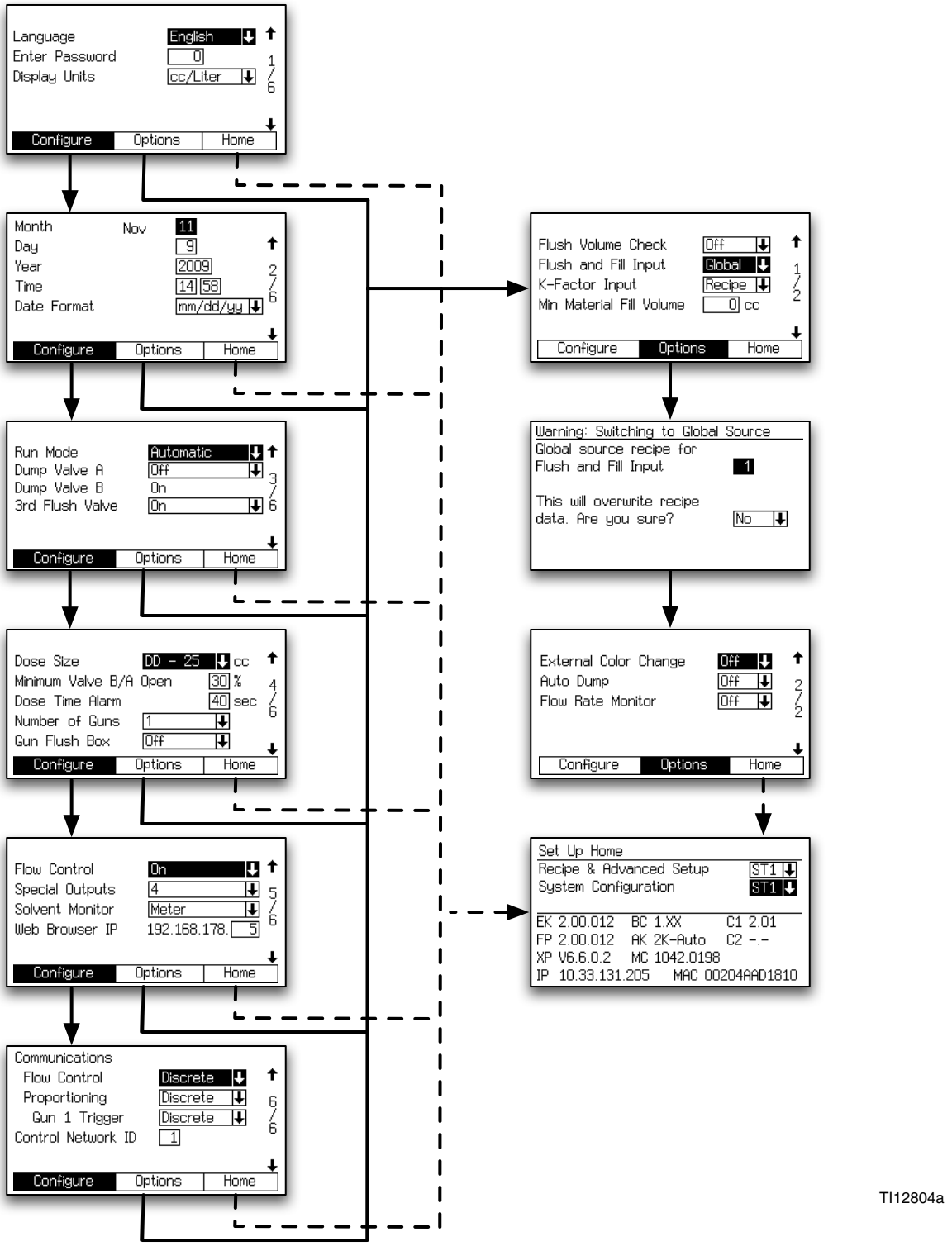


FIG. 26. System Configuration and Option Screens Map

Configure Screen 1

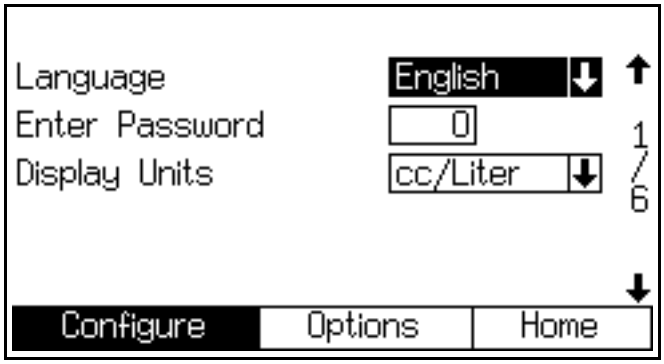


FIG. 27. Configure Screen 1

Language

Defines the language of the screen text. Select English (default), Spanish, French, German, Italian, Dutch, Japanese (Kanji), Korean, and Chinese (Simplified).

Password

The password is only used to enter Setup mode. The default is 0, which means no password is required to enter Setup. If a password is desired, enter a number from 1 to 9999.

NOTE: Be sure to write down the password and keep it in a secure location.

Display Units

Select the desired display units:

- cc/liter (default)
- cc/gallon

Configure Screen 2

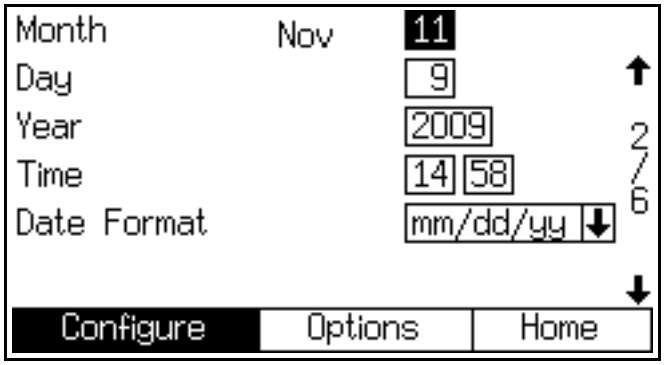


FIG. 28. Configure Screen 2

Month

Enter current month.

Day

Enter current day.

Year

Enter current year (four digits).

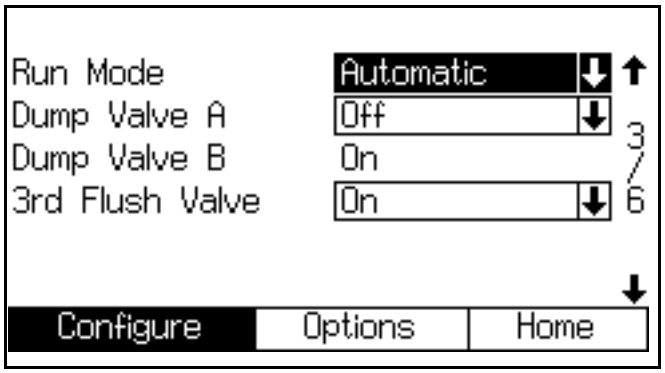
Time

Enter current time in hours (24 hour clock) and minutes. Seconds are not adjustable.

Date Format

Select mm/dd/yy or dd/mm/yy.

Configure Screen 3



OR

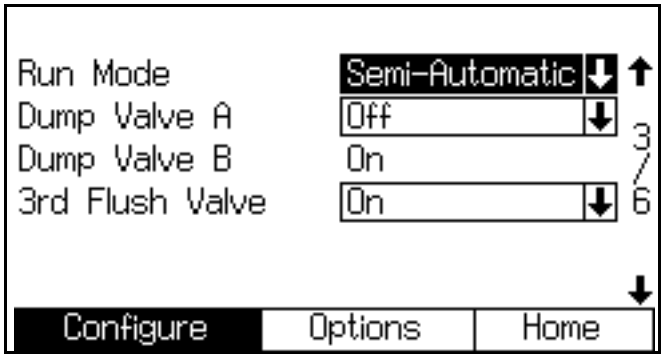


FIG. 29. Configure Screen 3

Run Mode

Select the Run mode application from the pulldown menu: Automatic (default), Semi-Automatic (uses a manual spray gun), or Manual.

Dump Valve A

This field only appears if the system includes an optional dump valve A. If dump valve A is included, set to On.

Dump Valve B

This field only appears if the catalyst change option is detected from the cc board, meaning that dump valve B is present. On is the only setting.

3rd Flush Valve

Off is default. If optional 3rd flush valve is used, set to On.

Configure Screen 4

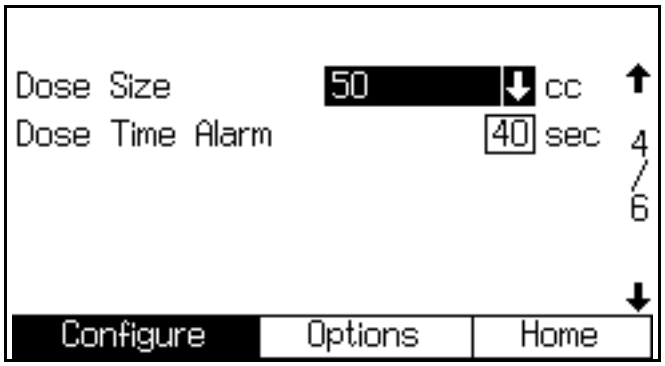


FIG. 30. Configure Screen 4

Dose Size

Select the total dose size (cc) from the pulldown menu: 100, 50, 25, or 10. The DD selection (dynamic dosing) is not used with the ProControl 1KS.

Dose Time Alarm

Enter the dose time (1 to 99 seconds). This is the amount of time allowed for a dose to occur before a dose time alarm occurs.

Number of Guns

Enter the number of spray guns (1 or 2).

NOTE: Only 1 gun is used in automatic mode.

Gun Flush Box (manual or semi-automatic mode)

Enter the number of gun flush boxes (Off, 1, or 2).

Configure Screen 5

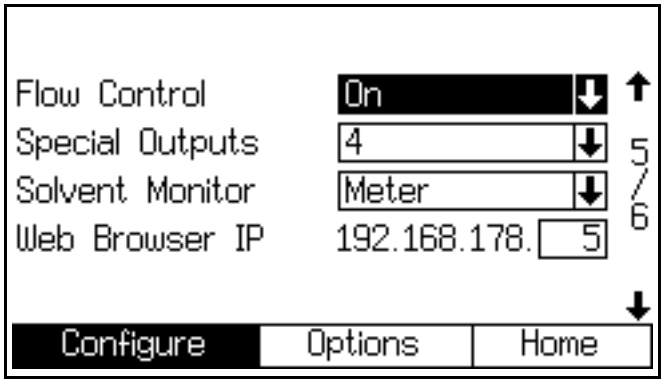


FIG. 31. Configure Screen 5

Flow Control

This field only appears if Run Mode is set to “Automatic” in **Configure Screen 3**, page 30. Select On or Off.

If set to “On,” **Advanced Setup Screen 5**, page 37 is added.

Special Outputs

Select special outputs (0-4). Each output has two different start times and durations.

Solvent Monitor

Select solvent monitor (Off, Flow Switch, or Meter).

Web Browser IP

The default web browser IP address prefix is 192.168.178.__ Assign a unique number for each EasyKey in your system (1-99) and enter it here.

Configure Screen 6

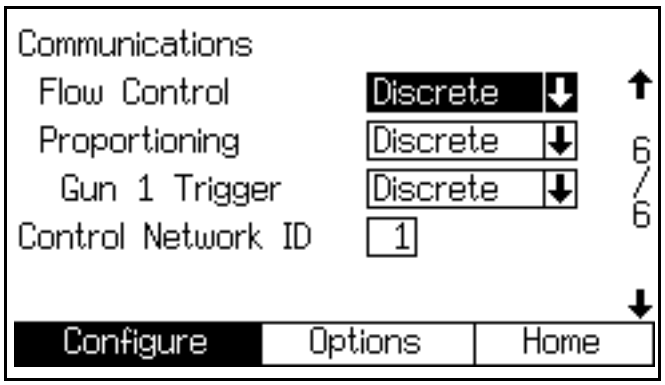


FIG. 32. Configure Screen 6 (Automatic mode shown)

Flow Control

This field only appears if Run Mode is set to “Automatic” in **Configure Screen 3**, page 30. Select “Discrete” or “Network.”

Proportioning

Select “Discrete” or “Network.”

Gun 1 Trigger

Displays AFS if Run Mode is set to “Semi-automatic” in **Configure Screen 3**, page 30.

Select “Discrete” or “Network” if Run Mode is set to “Automatic” in **Configure Screen 3**, page 30.

Gun 2 Trigger

Displays AFS if Number of Guns is set to “2” in **Configure Screen 4**, page 30.

Control Network ID

Used for the Graco Gateway network system. See Graco Gateway manual 312785 for further information

Option Screens

NOTE: See FIG. 26 on page 28 for a map of the **Option Screens**. Detailed screen descriptions follow.

NOTE: Each screen displays the current screen number and the total number of screens in the group.

Option Screen 1

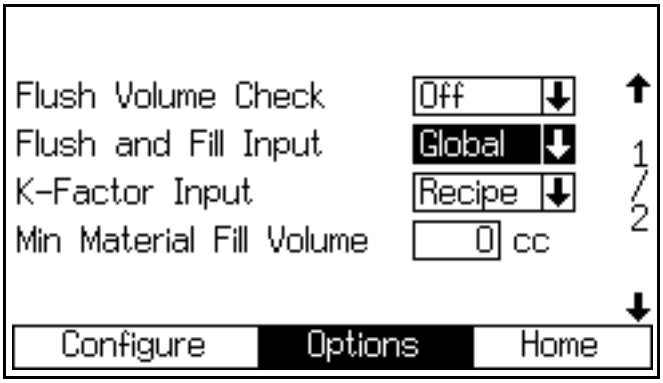


FIG. 33. Option Screen 1

Flush Volume Check

This field only appears if Solvent Monitor is set to “Meter” in **Configure Screen 5**, page 31.

If set to “On”, Minimum Flush Volume will appear in **Recipe Setup Screen 2**, page 40.

Flush and Fill Input

If set to “Global”, Color/Catalyst Purge and Color/Catalyst Fill are added to **Advanced Setup Screen 1**, page 35. **Advanced Setup Screen 2 and 3** are added. See pages 36-38.

If set to “Recipe”, Color/Catalyst Purge and Color/Catalyst Fill are added to **Recipe Setup Screen 2**, page 40. **Recipe Setup Screen 3, 4, and 7** are added. See pages 41-42.

K-Factor Input

If set to “Global,” **Advanced Setup Screen 4**, page 37 is added.

If set to “Recipe,” **Recipe Setup Screen 5**, page 42, is added.

Minimum Material Fill Volume

Enter 0-9999 cc.

Verification Screen

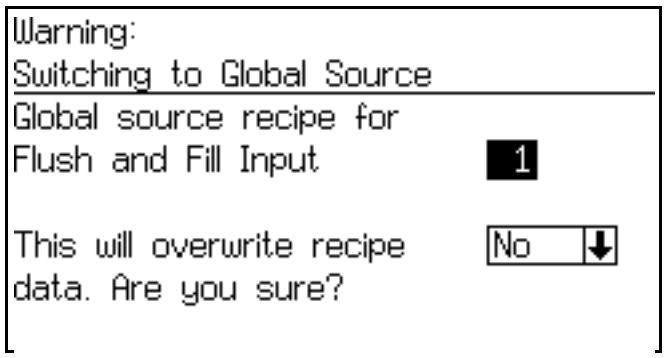


FIG. 34. Verification Screen

Verification

This screen appears if Flush and Fill Input or K-Factor Input are changed from “Recipe” to “Global” in **Option Screen 1**.

Option Screen 2

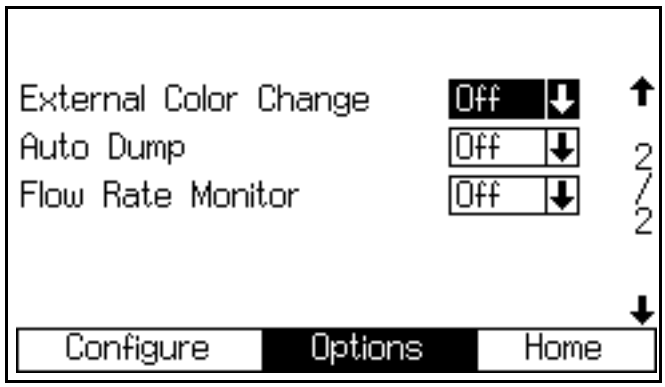


FIG. 35. Option Screen 2

External Color Change

If set to “Off”, Color/Catalyst Purge Time and Color/Catalyst Fill Time appear in **Advanced Setup Screen 1**, page 35 or **Recipe Setup Screen 2**, page 40 (depending on whether Flush and Fill Inputs are set to “Global” or “Recipe”).

If set to “On”, these fields are removed from the screens.

Auto Dump

If the auto dump feature is being used, set to “On”. Once the auto dump is enabled, the gun flush box is enabled and the potlife alarm is active for 2 minutes, the system will automatically flush out the old material.

Flow Rate Monitor

This field only appears if Flow Control is set to “Off” in **Configure Screen 5**, page 31.

If set to “On,” **Recipe Setup Screen 6** on page 42 is added, enabling setting of high and low flow limits.

If set to “Off,” flow rate monitoring is disabled and **Recipe Setup Screen 6** on page 42 will not appear.

Advanced Setup Screens

NOTE: See FIG. 36 for a map of the **Advanced Setup Screens**. Detailed screen descriptions follow.

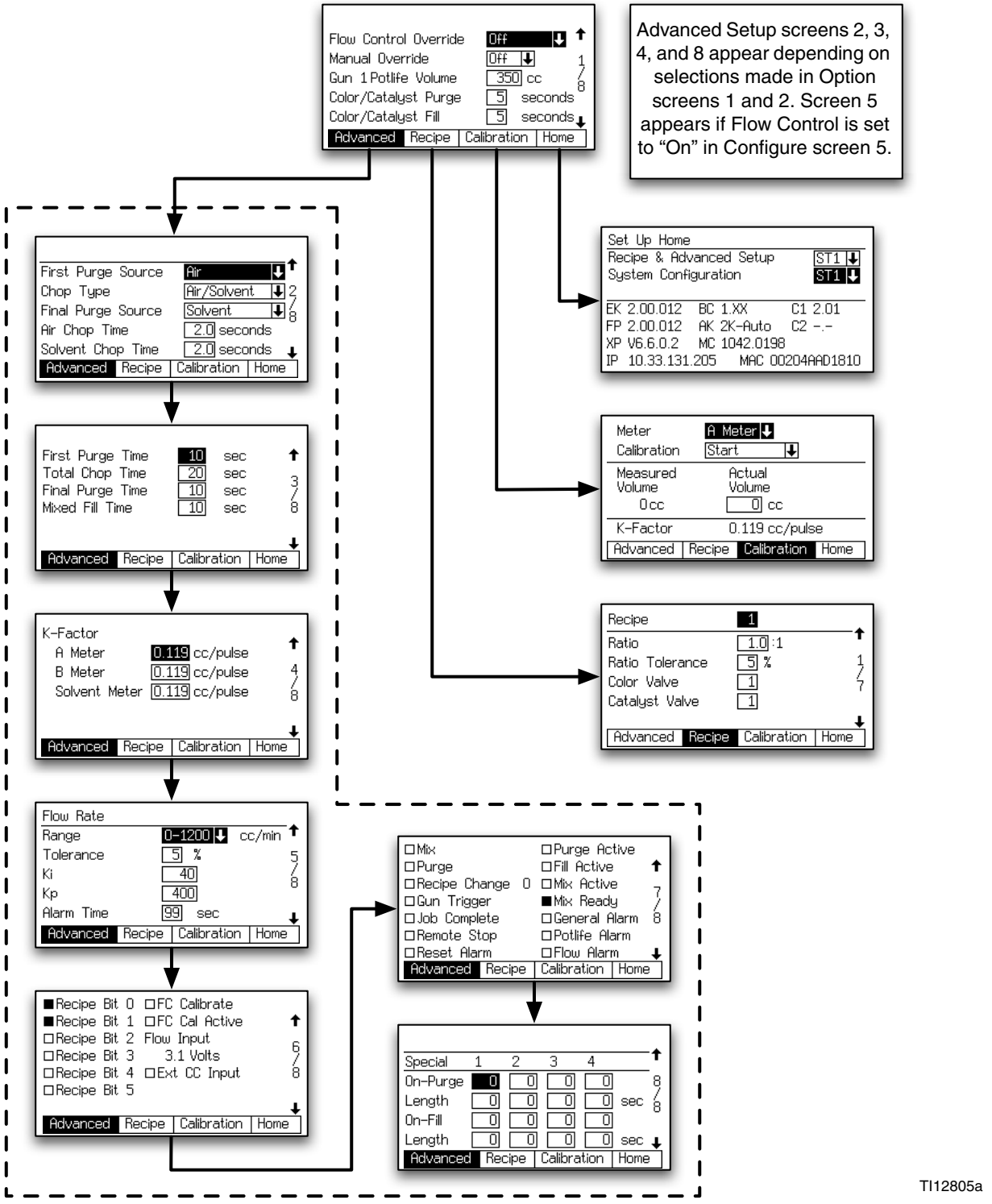


FIG. 36. Advanced Setup Screens Map

NOTE: Each screen displays the current screen number and the total number of screens in the group. The total number of screens in a group and the fields displayed on each screen may vary depending on selections made in the **System Configuration Screens** and **Option Screens**.

Advanced Setup Screen 1

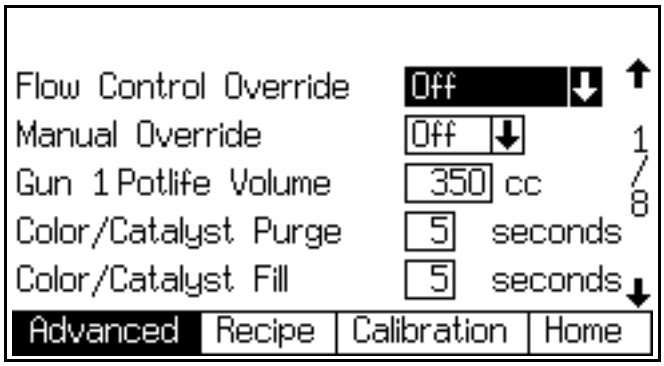


FIG. 37. Advanced Setup Screen 1

Flow Control Override

This field only appears if Flow Control is set to “On” in **Configure Screen 5** on page 31. The selections made will affect the display in **Manual Override Screen** on page 22. Choose the desired selection as defined below:

Selection	Description
Off	Normal operation
% Open	Flow control regulator is opened to a desired percentage.
Pressure	Flow control regulator is opened to a calibrated pressure.

Manual Override

This field only appears if Run Mode is set to “Automatic” or “Semi-automatic” in **Configure Screen 3**, page 30. Set to “On” to override all outside control. If selected, the **Manual Override Screen** (page 22) will be added.

Gun 1/Gun2 Potlife Volume

Enter the potlife volume (1 to 1999 cc) for each gun. This is the amount of material required to move through the mix manifold, hose and applicator/gun before the potlife timer is reset.

Use the following information to determine approximate pot life volume (PLV) in cc:

Hose ID (inches)	Volume (cc/foot)*
3/16	5.43
1/4	9.648
3/8	21.71

Integrator manifold and mixer volume = 75 cc
Spray Gun Volume = 20 cc

(Hose Volume* x Feet of Hose) + 75 + 20 = PLV

Color/Catalyst Purge

NOTE: ProControl 1KS uses Color only.

This field only appears if the system includes a color change module and Flush and Fill Input is set to “Global” in **Option Screen 1**, page 32. Enter the purge time (0 to 99 seconds). It refers to the amount of time required to flush the lines from the color or catalyst module to the dose valve or dump valve.

Color/Catalyst Fill

NOTE: ProControl 1KS uses Color only.

This field only appears if the system includes a color change module and Flush and Fill Input is set to “Global” in **Option Screen 1**, page 32. Enter the fill time (0 to 99 seconds). It refers to the time required to fill the lines from the color or catalyst module to the dose valve or dump valve.

Advanced Setup Screen 2

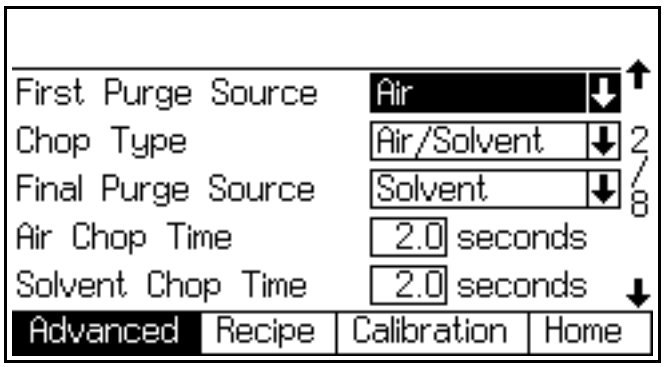


FIG. 38. Advanced Setup Screen 2

This screen appears only if Flush and Fill Input is set to "Global" in **Option Screen 1**, page 32.

First Purge Source

Select "Air," "Solvent," or "3rd Flush Valve" (available only if 3rd Flush Valve is set to "On" in **Configure Screen 3** on page 30).

Chop Type

Select "Air/Solvent" or "Air/3rd Flush Valve" (available only if 3rd Flush Valve is set to "On" in **Configure Screen 3** on page 30). This refers to the process of mixing air and solvent (or air and 3rd flush fluid) together during the flush cycle, to help clean the lines and reduce solvent usage.

Final Purge Source

Select "Air," "Solvent," or "3rd Flush Valve" (available only if 3rd Flush Valve is set to "On" in **Configure Screen 3** on page 30).

Air Chop Time

Enter the air chop time (0.0 to 99.9 seconds).

Solvent Chop Time/3rd Flush Valve Chop Time

Enter the solvent or 3rd flush valve chop time (0.0 to 99.9 seconds).

Advanced Setup Screen 3

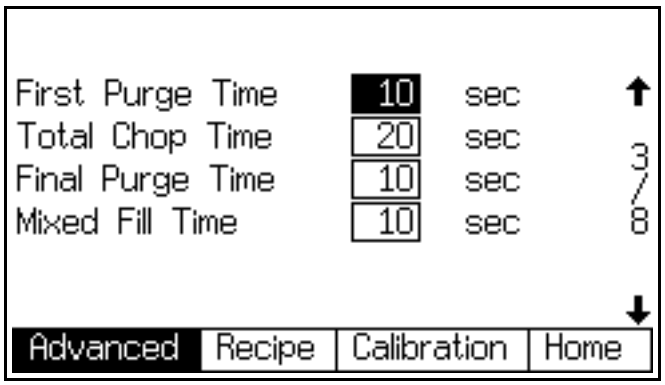


FIG. 39. Advanced Setup Screen 3

This screen appears only if Flush and Fill Input is set to "Global" in **Option Screen 1**, page 32.

If Number of Guns is set to "2" in **Configure Screen 4**, page 30, a Gun 2 column will appear in this screen.

First Purge Time

Enter the first purge time (0 to 999 seconds).

Total Chop Time

Enter the total chop time (0 to 999 seconds).

Final Purge Time

Enter the final purge time (0 to 999 seconds).

Mixed Material Fill Time

Enter the mixed material fill time (0 to 999 seconds). It refers to the amount of material that is required to fill from the dose valves to the applicator/gun.

Advanced Setup Screen 4

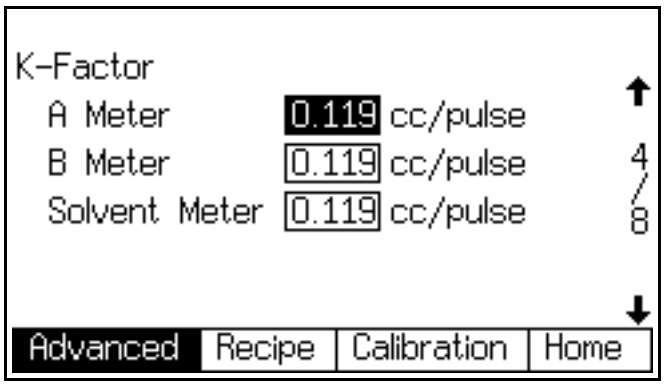


FIG. 40. Advanced Setup Screen 4

This screen appears only if K-Factor Input is set to "Global" in **Option Screen 1**, page 32.

K-factor A Meter

Enter the k-factor (cc/pulse) for flow meter A. This is the amount of material that passes through the flow meter per pulse (electrical pulse signal).

K-factor B Meter

NOTE: Not used with ProControl 1KS.

Enter the k-factor (cc/pulse) for flow meter B.

K-factor Solvent Meter

This field only appears if Solvent Monitor in **Configure Screen 5**, page 31, is set to "Meter." Enter the k-factor (cc/pulse) for the solvent flow meter.

Advanced Setup Screen 5

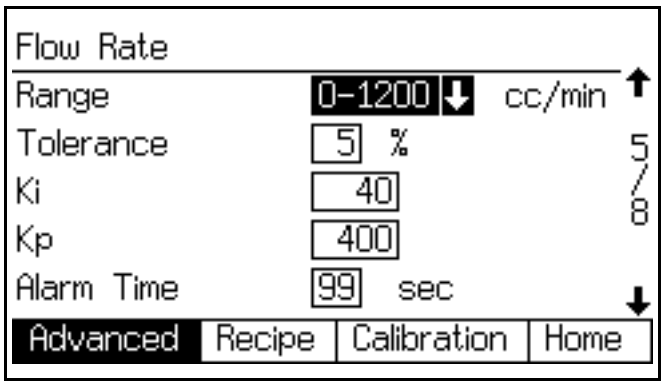


FIG. 41. Advanced Setup Screen 5 (Automatic Mode with Flow Control Only)

This screen appears only if Flow Control is set to "On" in **Configure Screen 5**, page 31.

Flow Rate Range

Enter the flow rate range (0-300, 0-600, or 0-1200). This determines the flow control PID loop resolution.

Flow Rate Tolerance

Enter the flow rate tolerance (1 to 99%). This is the percentage of variance that the system will allow before a flow rate warning/alarm occurs.

Flow Rate Ki

Enter the flow rate Ki (flow control PID loop integral value). This refers to the degree that fluid flow overshoots its set point.

Flow Rate Kp

Enter the flow rate Kp (flow control PID loop gain value). This refers to the speed at which the fluid flow reaches its set point.

Flow Rate Alarm Time

Enter the flow rate alarm time (1 to 99 seconds).

Advanced Setup Screen 6

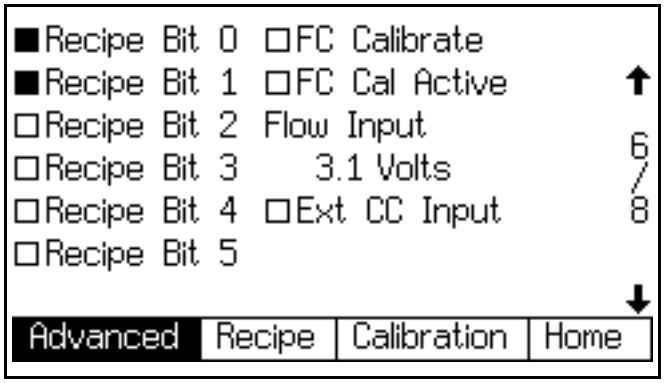


FIG. 42. Advanced Setup Screen 6

This screen shows the status of recipe analog inputs and digital outputs. If box is shaded the input recipe is active.

Advanced Setup Screen 7

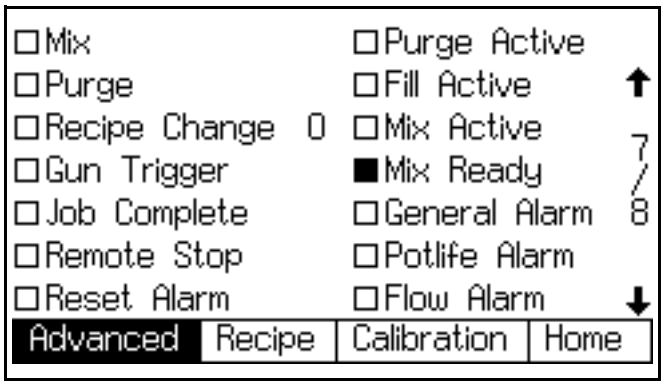


FIG. 43. Advanced Setup Screen 7

This screen shows the status of digital inputs and digital outputs. If box is shaded the input is active. If not, input is off.

Advanced Setup Screen 8

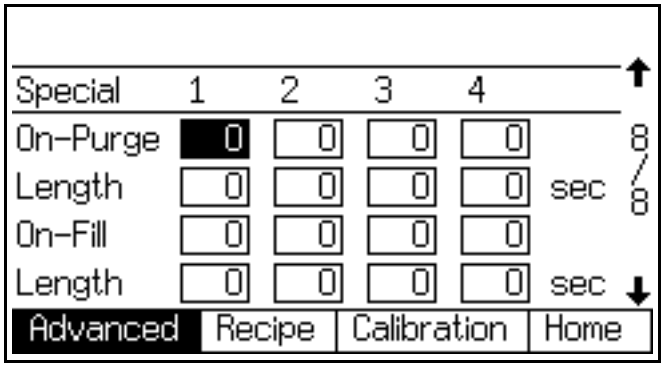


FIG. 44. Advanced Setup Screen 8

This screen appears only if Flush and Fill Input is set to "Global" in **Option Screen 1**, page 32 **and** Special Outputs is set to 1, 2, 3, or 4 in **Configure Screen 5**, page 31. The I/O board has four programmable outputs.

Recipe Setup Screens

NOTE: See FIG. 45 for a map of the Recipe screens. Detailed screen descriptions follow.

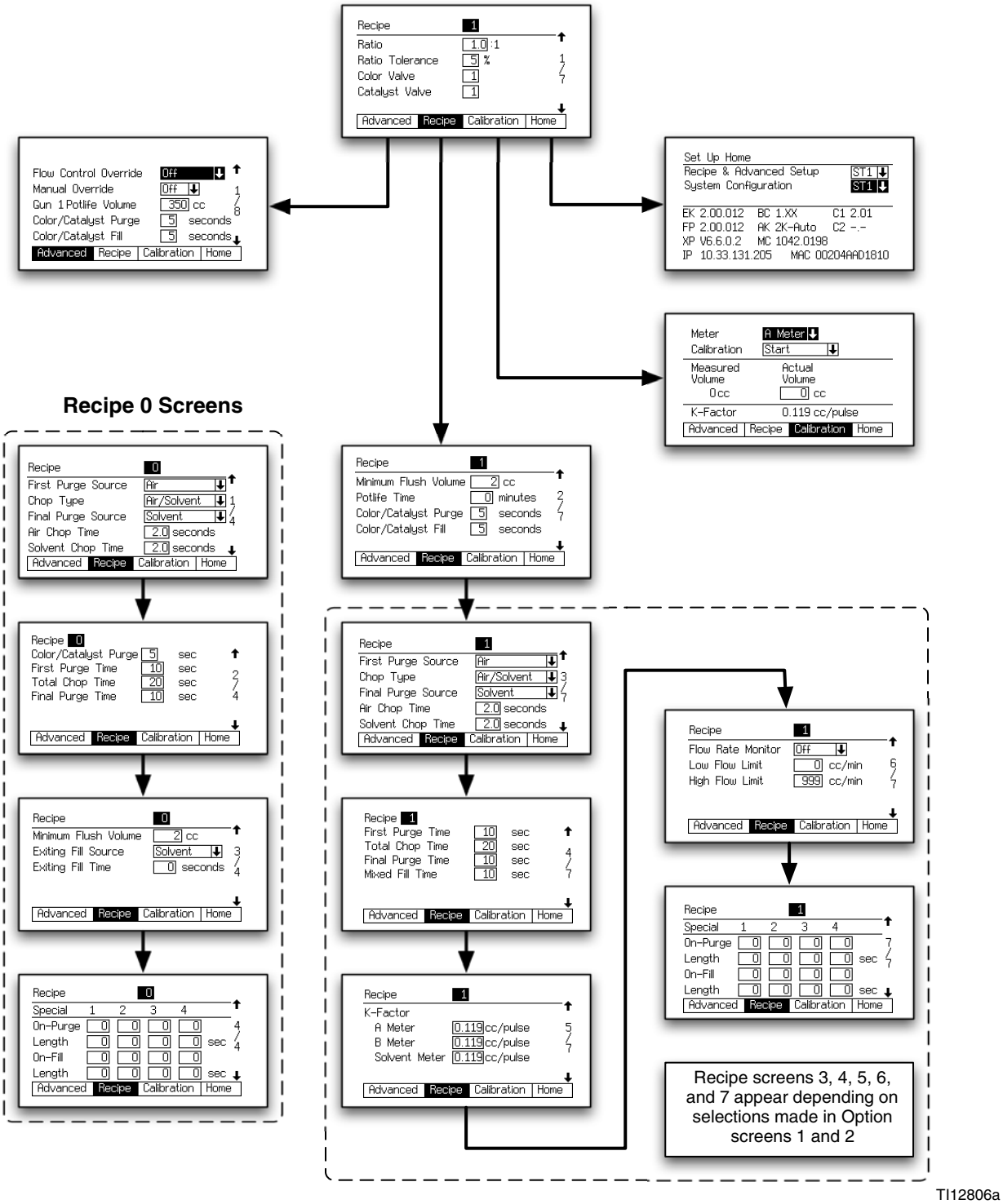

Recipe 1
Ratio 1.0 :1
Ratio Tolerance 5 %
Color Valve 1
Catalyst Valve 1
Advanced Recipe Calibration Home
Flow Control Override Off
Manual Override Off
Gun 1 Potlife Volume 350 cc
Color/Catalyst Purge 5 seconds
Color/Catalyst Fill 5 seconds
Advanced Recipe Calibration Home
Set Up Home
Recipe & Advanced Setup ST1
System Configuration ST1
EK 2.00.012 BC 1.XX C1 2.01
FP 2.00.012 AK 2K-Auto C2 -.-
XP V6.6.0.2 MC 1042.0198
IP 10.33.131.205 MAC 00204AAD1810
Meter A Meter
Calibration Start
Measured Volume 0 cc
Actual Volume 0 cc
K-Factor 0.119 cc/pulse
Advanced Recipe Calibration Home
Recipe 0 Screens
Recipe 0
First Purge Source Air
Chop Type Air/Solvent
Final Purge Source Solvent
Air Chop Time 2.0 seconds
Solvent Chop Time 2.0 seconds
Advanced Recipe Calibration Home
Recipe 0
Color/Catalyst Purge 5 sec
First Purge Time 10 sec
Total Chop Time 20 sec
Final Purge Time 10 sec
Advanced Recipe Calibration Home
Recipe 0
Minimum Flush Volume 2 cc
Exiting Fill Source Solvent
Exiting Fill Time 0 seconds
Advanced Recipe Calibration Home
Recipe 0
Special 1 2 3 4
On-Purge 0 0 0 0
Length 0 0 0 0 sec
On-Fill 0 0 0 0
Length 0 0 0 0 sec
Advanced Recipe Calibration Home
Recipe 1
Minimum Flush Volume 2 cc
Potlife Time 0 minutes
Color/Catalyst Purge 5 seconds
Color/Catalyst Fill 5 seconds
Advanced Recipe Calibration Home
Recipe 1
First Purge Source Air
Chop Type Air/Solvent
Final Purge Source Solvent
Air Chop Time 2.0 seconds
Solvent Chop Time 2.0 seconds
Advanced Recipe Calibration Home
Recipe 1
First Purge Time 10 sec
Total Chop Time 20 sec
Final Purge Time 10 sec
Mixed Fill Time 10 sec
Advanced Recipe Calibration Home
Recipe 1
K-Factor
A Meter 0.119 cc/pulse
B Meter 0.119 cc/pulse
Solvent Meter 0.119 cc/pulse
Advanced Recipe Calibration Home
Recipe 1
Flow Rate Monitor Off
Low Flow Limit 0 cc/min
High Flow Limit 999 cc/min
Advanced Recipe Calibration Home
Recipe 1
Special 1 2 3 4
On-Purge 0 0 0 0
Length 0 0 0 0 sec
On-Fill 0 0 0 0
Length 0 0 0 0 sec
Advanced Recipe Calibration Home
Recipe screens 3, 4, 5, 6, and 7 appear depending on selections made in Option screens 1 and 2
TI12806a

FIG. 45: Recipe Screens Map

NOTE: Each screen displays the current screen number and the total number of screens in the group. The total number of screens in a group and the fields displayed on each screen may vary depending on selections made in the **System Configuration Screens** and **Option Screens**.

Recipe Setup Screen 1

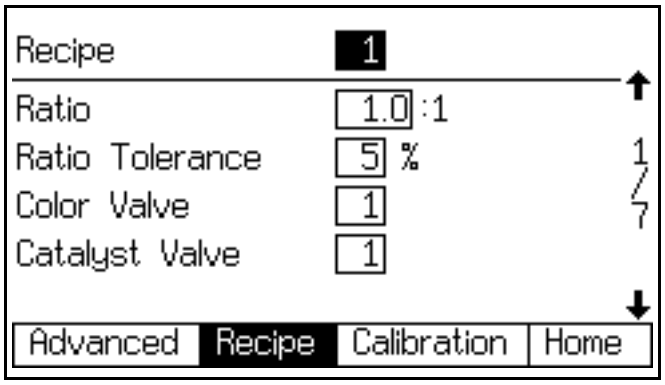


FIG. 46. Recipe Setup Screen 1

Ratio

Enter the mix ratio of component A over component B (0.0:1 to 50:1). Set to 0:1 for ProControl 1KS.

Ratio Tolerance

Enter the ratio tolerance (1 to 99%). This refers to the percent of acceptable variance that the system will allow before a ratio alarm occurs.

Component A (Color) Valve (if present)

This field only appears if the system includes a color change module. Enter the color valve number (1 to 30).

Component B (Catalyst) Valve (if present)

NOTE: Not used with ProControl 1KS.

This field only appears if the system includes a color change module. Enter the catalyst valve number (1 to 4).

Recipe Setup Screen 2

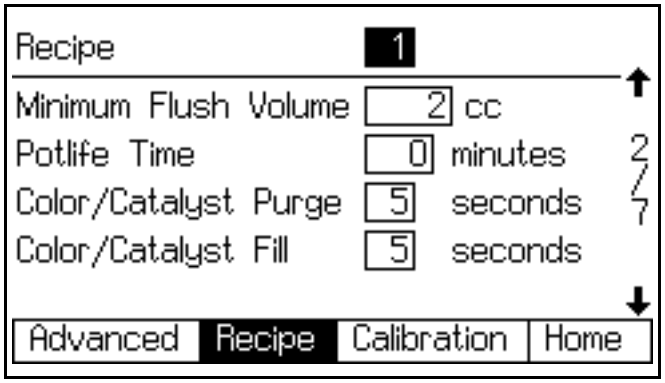


FIG. 47. Recipe Setup Screen 2

Minimum Flush Volume

This field only appears if Flush Volume Check is set to “On” in **Option Screen 1** on page 32. Enter the minimum flush volume (0 to 999 cc). Entering 0 disables this function.

Potlife Time

Enter the potlife time (0 to 999 minutes). Entering 0 disables this function.

Color/Catalyst Purge

NOTE: ProControl 1KS uses Color only.

This field only appears if the system includes a color change module and Flush and Fill Input is set to “Recipe” in **Option Screen 1**, page 32. Enter the purge time (0 to 99 seconds). It refers to the amount of time required to flush the lines from the color or catalyst module to the dose valve or dump valve.

Color/Catalyst Fill

NOTE: ProControl 1KS uses Color only.

This field only appears if the system includes a color change module and Flush and Fill Input is set to “Recipe” in **Option Screen 1**, page 32. Enter the fill time (0 to 99 seconds). It refers to the time required to fill the lines from the color or catalyst module to the dose valve or dump valve.

Recipe Setup Screen 3

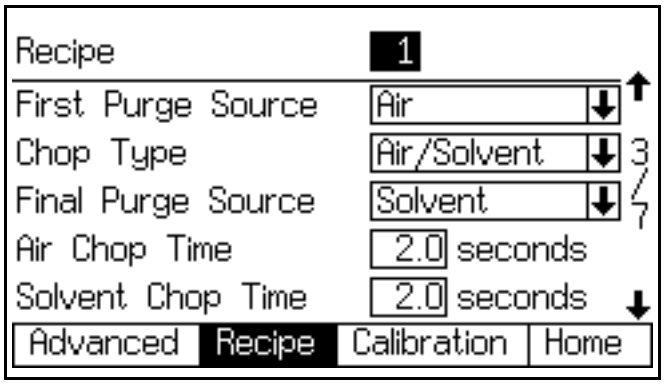


FIG. 48. Recipe Setup Screen 3

This screen appears only if Flush and Fill Input is set to "Recipe" in **Option Screen 1**, page 32.

First Purge Source

Select "Air," "Solvent," or "3rd Flush Valve" (available only if 3rd Flush Valve is set to "On" in **Configure Screen 3** on page 30).

Chop Type

Select "Air/Solvent" or "Air/3rd Flush Valve" (available only if 3rd Flush Valve is set to "On" in **Configure Screen 3** on page 30). This refers to the process of mixing air and solvent (or air and 3rd flush fluid) together during the flush cycle, to help clean the lines and reduce solvent usage.

Final Purge Source

Select "Air," "Solvent," or "3rd Flush Valve" (available only if 3rd Flush Valve is set to "On" in **Configure Screen 3** on page 30).

Air Chop Time

Enter the air chop time (0.0 to 99.9 seconds).

Solvent Chop Time/3rd Flush Valve Chop Time

Enter the solvent or 3rd flush valve chop time (0.0 to 99.9 seconds).

Recipe Setup Screen 4

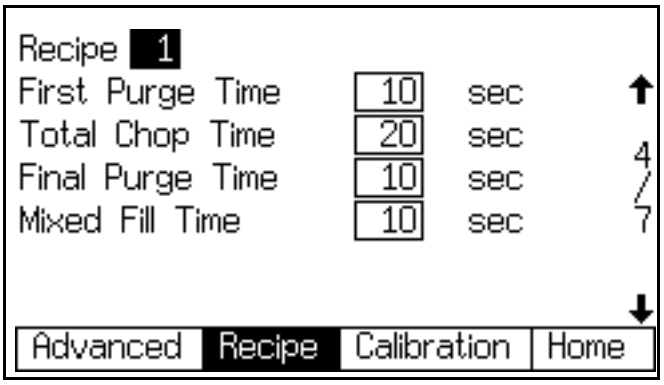


FIG. 49. Recipe Setup Screen 4

This screen appears only if Flush and Fill Input is set to "Recipe" in **Option Screen 1**, page 32.

If Number of Guns is set to "2" in **Configure Screen 4**, page 30, a Gun 2 column will appear in this screen.

First Purge Time

Enter the first purge time (0 to 999 seconds).

Total Chop Time

Enter the total chop time (0 to 999 seconds).

Final Purge Time

Enter the final purge time (0 to 999 seconds).

Mixed Material Fill Time

Enter the mixed material fill time (0 to 999 seconds). It refers to the amount of material that is required to fill from the dose valves to the applicator/gun.

Recipe Setup Screen 5

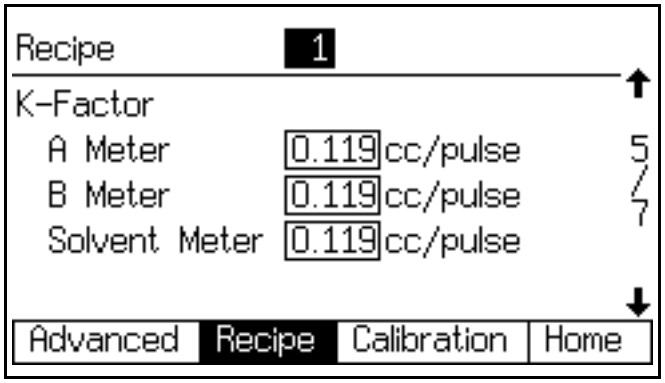


FIG. 50. Recipe Setup Screen 5

This screen appears only if K-Factor Input is set to “Recipe” in **Option Screen 1**, page 32.

K-factor A Meter

Enter the k-factor (cc/pulse) for flow meter A. This is the amount of material that passes through the flow meter per pulse (electrical pulse signal).

K-factor B Meter

NOTE: Not used with ProControl 1KS.

Enter the k-factor (cc/pulse) for flow meter B.

K-factor Solvent Meter

This field only appears if Solvent Monitor is set to “Meter” in **Configure Screen 5**, page 31. Enter the k-factor (cc/pulse) for the solvent flow meter.

Recipe Setup Screen 6

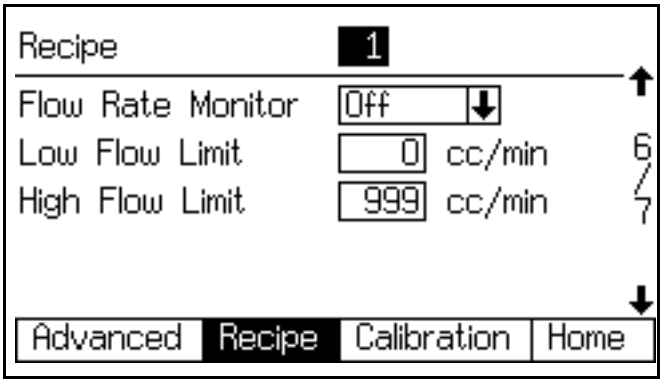


FIG. 51. Recipe Setup Screen 6

This screen appears only if Flow Rate Monitor is set to “On” in **Option Screen 2** on page 33.

Flow Rate Monitor

Select the desired flow rate monitoring (Off, Warning, or Alarm).

Low Flow Limit

Enter the low flow rate limit (1 to 3999 cc/min).

High Flow Limit

Enter the high flow rate limit (1 to 3999 cc/min).

Recipe Setup Screen 7

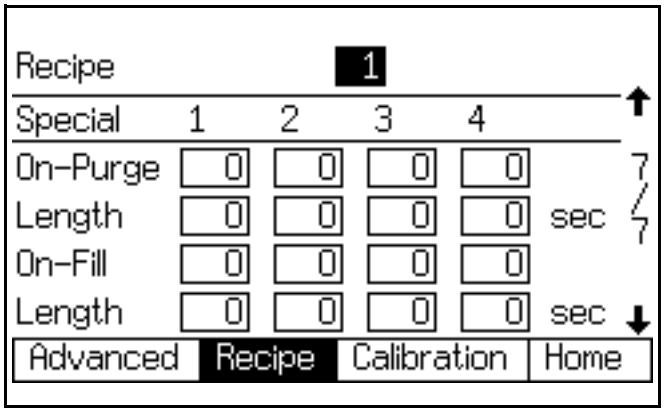


FIG. 52. Recipe Screen 7

This screen appears only if Flush and Fill Input is set to “Recipe” in **Option Screen 1**, page 32 **and** Special Outputs is set to 1, 2, 3, or 4 in **Configure Screen 5**, page 31. The I/O board has four programmable outputs.

Recipe 0 Screens

NOTE: See FIG. 45 on page 39 for a map of the Recipe 0 screens. Detailed screen descriptions follow.

Recipe 0 is typically used in multiple color systems to purge out material lines without loading a new color

NOTE: Each screen displays the current screen number and the total number of screens in the group. The total number of screens in a group and the fields displayed on each screen may vary depending on selections made in the **System Configuration Screens** and **Option Screens**.

Recipe 0 Screen 1

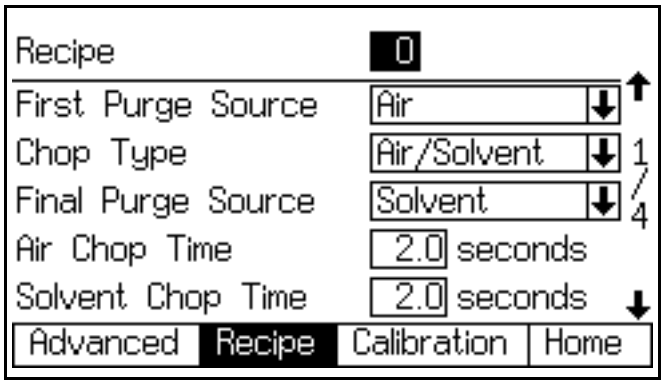


FIG. 53. Recipe 0 Screen 1

First Purge Source

Select “Air,” “Solvent,” or “3rd Flush Valve” (available only if 3rd Flush Valve is set to “On” in **Configure Screen 3** on page 30).

Chop Type

Select “Air/Solvent” or “Air/3rd Flush Valve” (available only if 3rd Flush Valve is set to “On” in **Configure Screen 3** on page 30). This refers to the process of mixing air and solvent (or air and 3rd flush fluid) together during the flush cycle, to help clean the lines and reduce solvent usage.

Final Purge Source

Select “Air,” “Solvent,” or “3rd Flush Valve” (available only if 3rd Flush Valve is set to “On” in **Configure Screen 3** on page 30).

Air Chop Time

Enter the air chop time (0.0 to 99.9 seconds).

Solvent Chop Time/3rd Flush Valve Chop Time

Enter the solvent or 3rd flush valve chop time (0.0 to 99.9 seconds).

Recipe 0 Screen 2

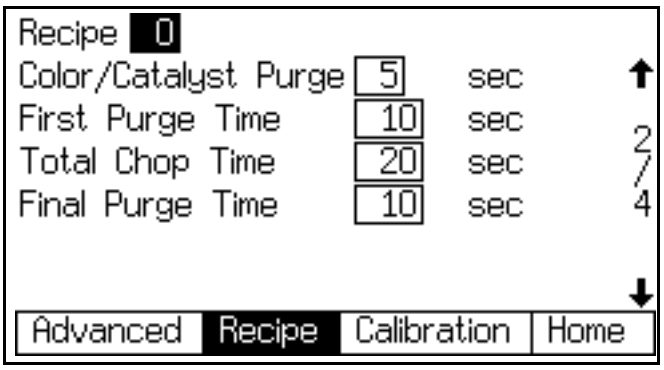


FIG. 54. Recipe 0 Screen 2

If Number of Guns is set to “2” in **Configure Screen 4**, page 30, a Gun 2 column will appear in this screen.

Color/Catalyst Purge Time

NOTE: ProControl 1KS uses Color only.

This field only appears if the system includes a color change module. Enter the purge time (0 to 999 seconds).

First Purge Time

Enter the first purge time (0 to 999 seconds).

Total Chop Time

Enter the total chop time (0 to 999 seconds).

Final Purge Time

Enter the final purge time (0 to 999 seconds).

Recipe 0 Screen 3

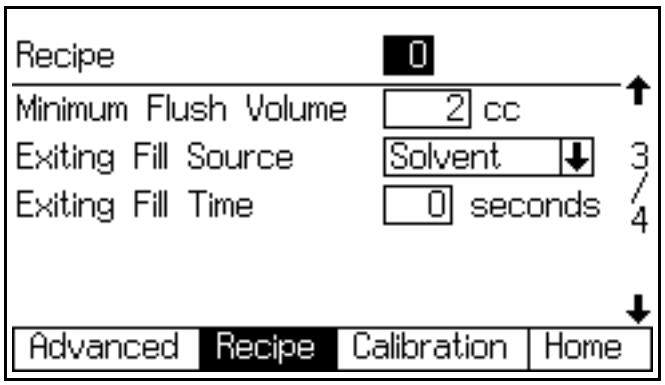


FIG. 55. Recipe 0 Screen 3

This screen only appears if Solvent Monitor is set to "Meter" in **Configure Screen 5**, page 31 **and** Flush Volume Check is set to "On" in **Option Screen 1**, page 32 **or** 3rd Flush Valve is set to "On" in **Configure Screen 3** on page 30.

Minimum Flush Volume
This field only appears if Flush Volume Check is set to "On" in **Option Screen 1** on page 32. Enter the minimum flush volume (0 to 999 cc).

Exiting Fill Source
This field only appears if 3rd Flush Valve is set to "On" in **Configure Screen 3** on page 30. Select "Off," "Air," "Solvent," or "3rd Valve."

Exiting Fill Time
This field only appears if Exiting Fill Source is set to "Air," "Solvent," or "3rd Valve." Enter the time in seconds.

Recipe 0 Screen 4

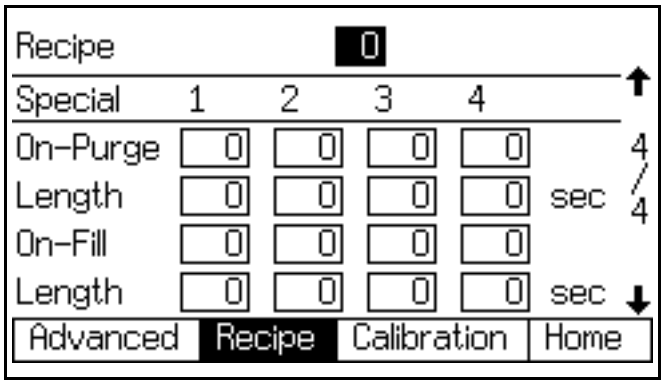


FIG. 56. Recipe 0 Screen 4

This screen appears only if Flush and Fill Input is set to "Recipe" in **Option Screen 1**, page 32 **and** Special Outputs is set to 1, 2, 3, or 4 in **Configure Screen 5**, page 31. The I/O board has four programmable outputs.

Calibration Screen

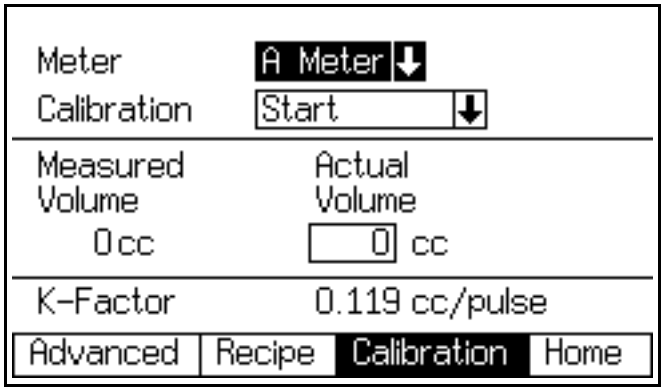


FIG. 57. Calibration Screen

Use this screen to calibrate a meter. Set to "Meter A," "Meter B," or "Solvent Meter" (available if Solvent Monitor in **Configure Screen 5**, page 31, is set to "Meter").

- **Start -** start calibration
- **Abort -** stop calibration
- **Purge -** purge sampling valves after calibration

See **Meter Calibration**, page 76, for when and how to calibrate meter.

ProControl 1KS Integration Specifics

Discrete I/O vs Network Communications

The ProControl 1KS system does not use a Booth Control. Instead, it uses Discrete I/O or Network Communications to drive the system. Each method can be used exclusively, or both at the same time.

In Automatic mode, the following fields can be set to “Discrete” or “Network” (see **Configure Screen 6** on page 31):

- Flow Control
- Proportioning
- Gun 1 Trigger

NOTE: In Semi-automatic mode, only the Proportioning field is available,

NOTE: The Manual Override function enables you to operate the system before the automation (PLC) is available. Manual Override still requires some communication through Discrete I/O or Network Communications. Although Manual Override is not intended to be the main mode of control, it can be used if proper Gun Trigger Input is provided.

Discrete I/O

Discrete I/O requires a 24 Vdc power supply which must be supplied on site. The ProControl 1KS does not supply power for Discrete I/O.

See Table 4 on page 49, FIG. 67 on page 58, and Table 8 on page 59 for inputs and outputs. Understanding these inputs and outputs is necessary to properly integrate the ProControl 1KS to the automation.

Input and output connections are made at the Discrete I/O terminal strips (FIG. 60) and the discrete I/O board (FIG. 61) inside the EasyKey. Also see the **System Electrical Schematic** on page 102.

Review the Color Change Charts (FIG. 78-FIG. 95). A full understanding of the color change sequence is necessary to properly drive the inputs and monitor the outputs.

See **Advanced Setup Screen 7**, page 38. This screen shows the actual status of all inputs and outputs. It is important to ensure that each input from local automation (PLC) is received by the EasyKey and to verify that the ProControl 1KS is sending outputs to the automation.

The following paragraphs describe each discrete I/O function in detail.

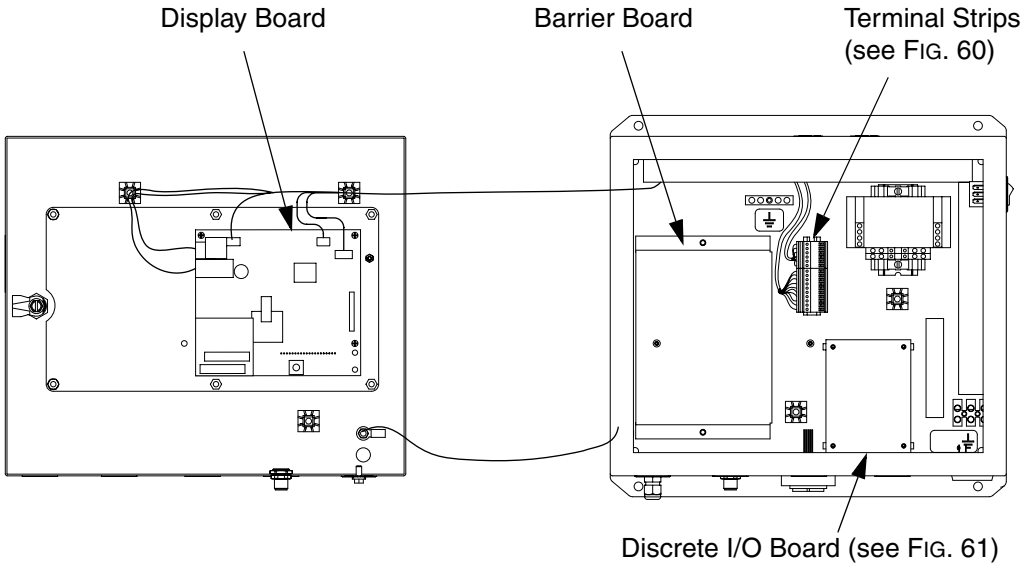


FIG. 58: EasyKey Control Boards

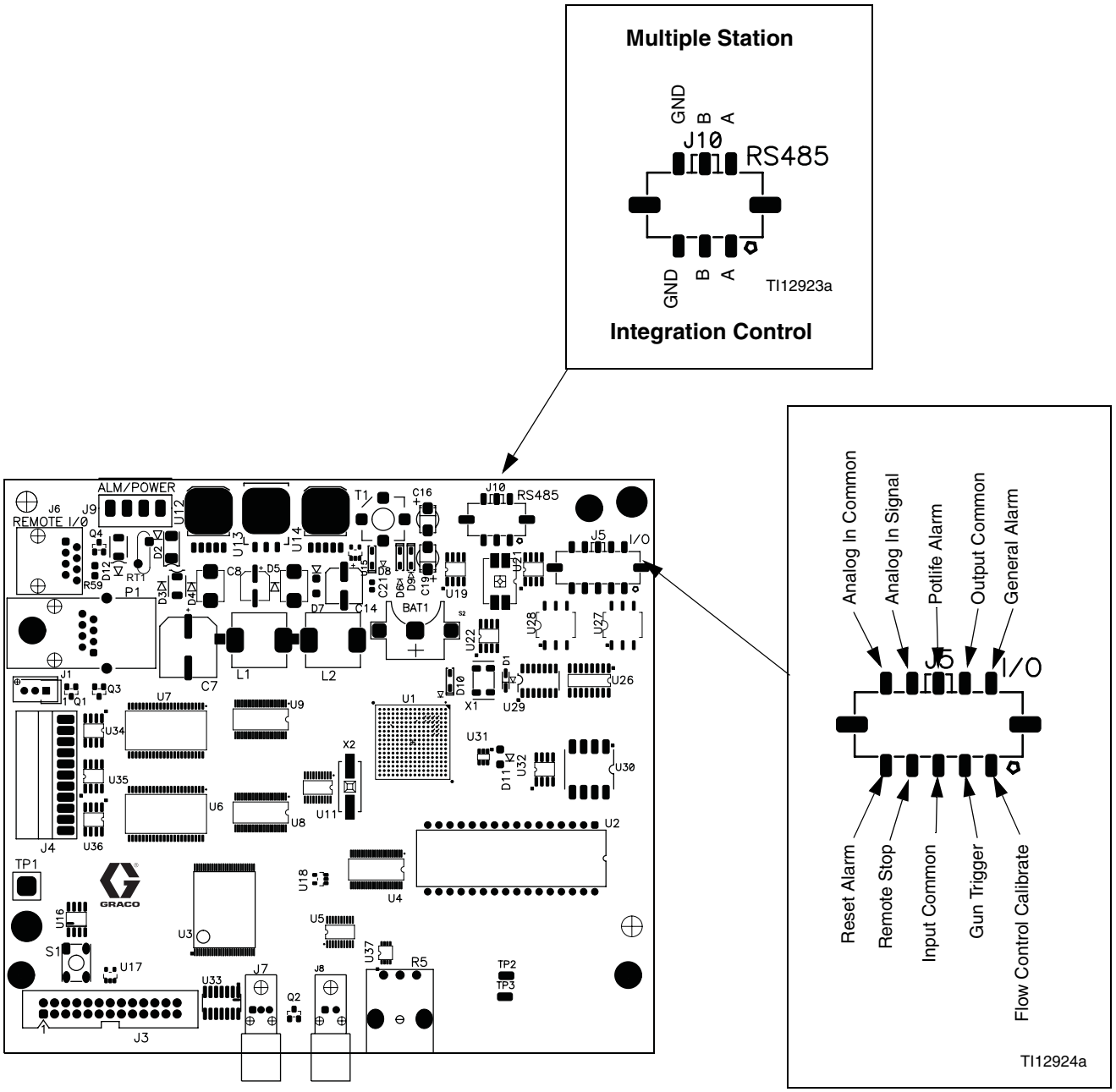


FIG. 59: 255767 EasyKey Display Board

Digital Inputs

See **Automation Flow Charts**, pages 50-54.

Mix Start: This is a ***maintained*** input. When High, the ProControl 1KS will attempt to enter Mix mode. This Mix Start input should not be attempted unless the Mix_Ready output is recognized. This ensures that there are no alarms and that the Mix Start input is appropriate.

This input stays High at all times when mixing on demand is required. When Low, the intent is to stop mixing material and perform a purge or recipe change.

Do not toggle this input to set the unit to Standby mode during short work stoppages. The ProControl 1KS will automatically go into Idle mode after 2 minutes of inactivity. When a Gun Trigger input is seen, the ProControl 1KS will automatically leave Idle mode and resume mixing material where it left off.

Purge Start: This is a ***maintained*** input. When recognized by the ProControl 1KS, the Purge Sequence will start, using the Purge Time from the active recipe. This will also include the Solvent Fill Time. Proper monitoring of the Purge/Color Change Output is required to ensure this function has begun. Once this output is removed, the system will immediately go to Standby mode.

Color Change Start: This is a ***momentary*** input, 100 msec minimum. When recognized by the ProControl 1KS, the Color Change sequence will begin, starting at the Color/Catalyst Dump.

NOTE: If the new recipe has the ***same color*** as the active recipe, then the Color/Catalyst Dump and Color/Catalyst Fill times are skipped and the Color Change Sequence starts with the Purge. Also, the recipe bit configuration for the Color Change must be loaded at least 100 msec before the Color Change Start input is turned on. The recipe bit configuration ***must*** remain on while the Color Change Start input is removed. Graco recommends the recipe bits stay active and do not change until a new color is required. The PLC should monitor the Purge/Color Change Output as well as the Fill Active Output to ensure the process happens as required. A complete color change without errors (resulting in a Mix Ready Output state) is a completed color change.

NOTE: This also applies if using the Modbus Registers (see the Modbus Map table in manual 312785).

Gun Trigger: When High, this input signals the ProControl 1KS that the gun is actually triggered. It should be sent every time the gun is triggered. This input provides timing for alarm functions and also drives the flow control functions. Without it, no flow control functions will start.

Job Complete: This is a ***momentary*** input, 100 msec minimum. When recognized by the ProControl 1KS, the Job totals are cleared and a time/date stamp is added for retrieval.

Remote Stop: Use this input when external equipment is used to stop the system. Clear any alarms before using this input. For more information about when this input is needed, contact your Graco distributor.

Alarm Reset: This is a ***momentary*** input, 100 msec minimum. When recognized by the ProControl 1KS it clears any active alarms and allows the automation to take the next step.

Common: This is not an input, but the ProControl 1KS expects to have the COM side of the 24 Vdc supply connected as shown in Table 8. This ensures proper operation of each input and output.

I/O Terminal Strip Detail

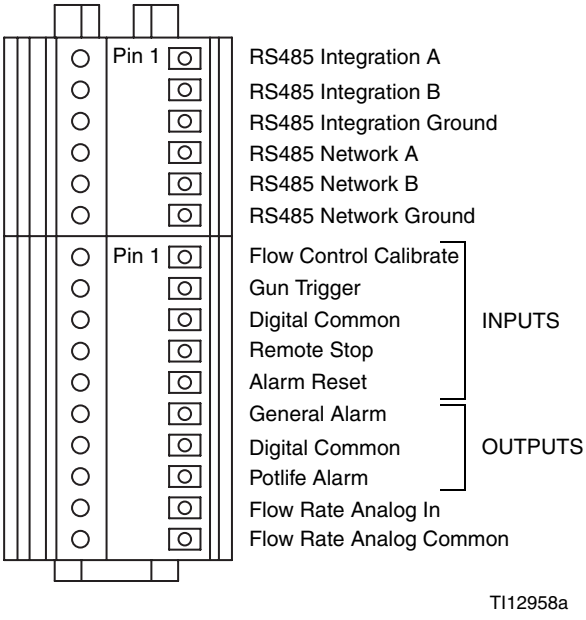


FIG. 60: EasyKey Terminal Strips

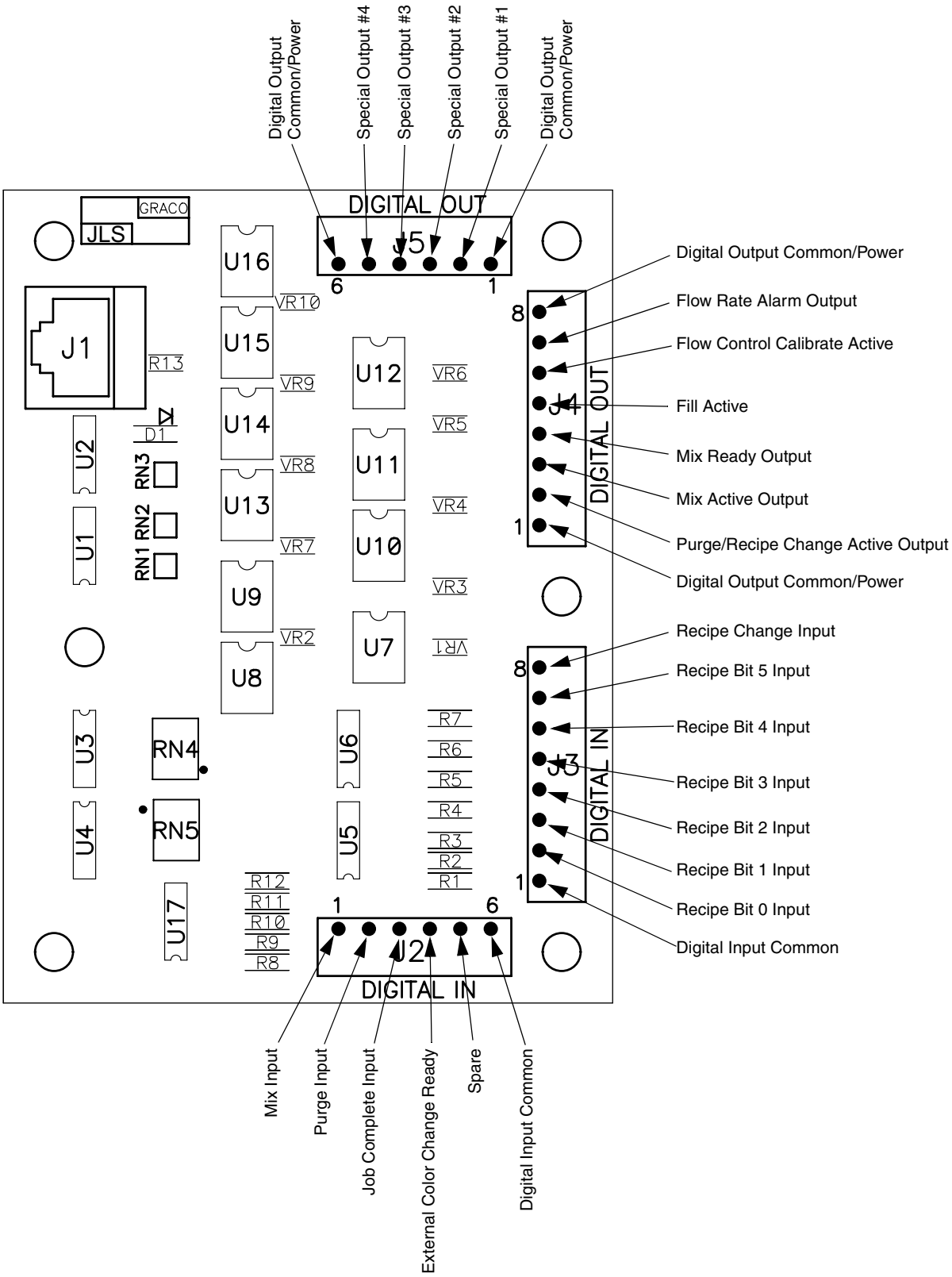


FIG. 61: 255766 Discrete I/O Board

Digital Outputs

See **Automation Flow Charts**, pages 50-54.

Purge_CC_Active: This output will remain High during the manual Purge or Color Change purge sequence. See the Color Change Charts (FIG. 78-FIG. 95) for further information.

Fill_Active: This output will remain High while the ProControl 1KS is in the Mixed Material Fill at the end of a typical color change sequence.

Mix_Active: This output will remain High while the ProControl 1KS is in Mix mode. There may be alarm outputs while this output is High; these are typically High/Low Flow Warnings. Always monitor this output and the alarm outputs to provide feedback of the actual status of the ProControl 1KS. (See the Modbus charts in the Graco Gateway manual 312785.)

Mix_Ready: This output will remain High while there are no alarms and the ProControl 1KS is ready to go to Mix mode.

General Alarm: This output will remain High when any alarm is active. See Table 13 on page 90 for a complete list of alarms.

NOTE: It is important to monitor this output along with Mix_Active to understand the alarm's true meaning.

Alarm_Potlife: This output will remain High along with the Alarm output when the potlife time has been reached for the active recipe. The Mix_Active output will drop Low, even if the Mix_Start input is High. This output will remain High until the potlife volume is dispensed or the ProControl 1KS completes a Purge or a Color Change. The Alarm Reset input will not stop this output but will silence the audible alarm on the EasyKey.

NOTE: The Alarm Reset key will also reset the audible alarm.

To dispense the potlife volume, the ProControl 1KS Mix_Start input must be turned Off then back to High to spray material. At this point, Mix_Active, Alarm, and Alarm_Potlife outputs will be High until the potlife volume is sprayed.

Digital Out Supply: This is the supply for the digital outputs. It is the same supply for the digital inputs. (See **Common** under **Digital Inputs**, page 47.)

Analog Inputs

Flow Command: This is the positive side of the 0 – 10 Vdc signal. (See **Common** under **Digital Inputs**, page 47.) This input corresponds to the Flow Range setting in **Advanced Setup Screen 5**, page 37. *For example,* if the setting is 0 – 300 cc/min, the 0 Vdc analog input is 0 cc/min, therefore the 10 Vdc analog input is 300 cc/min.

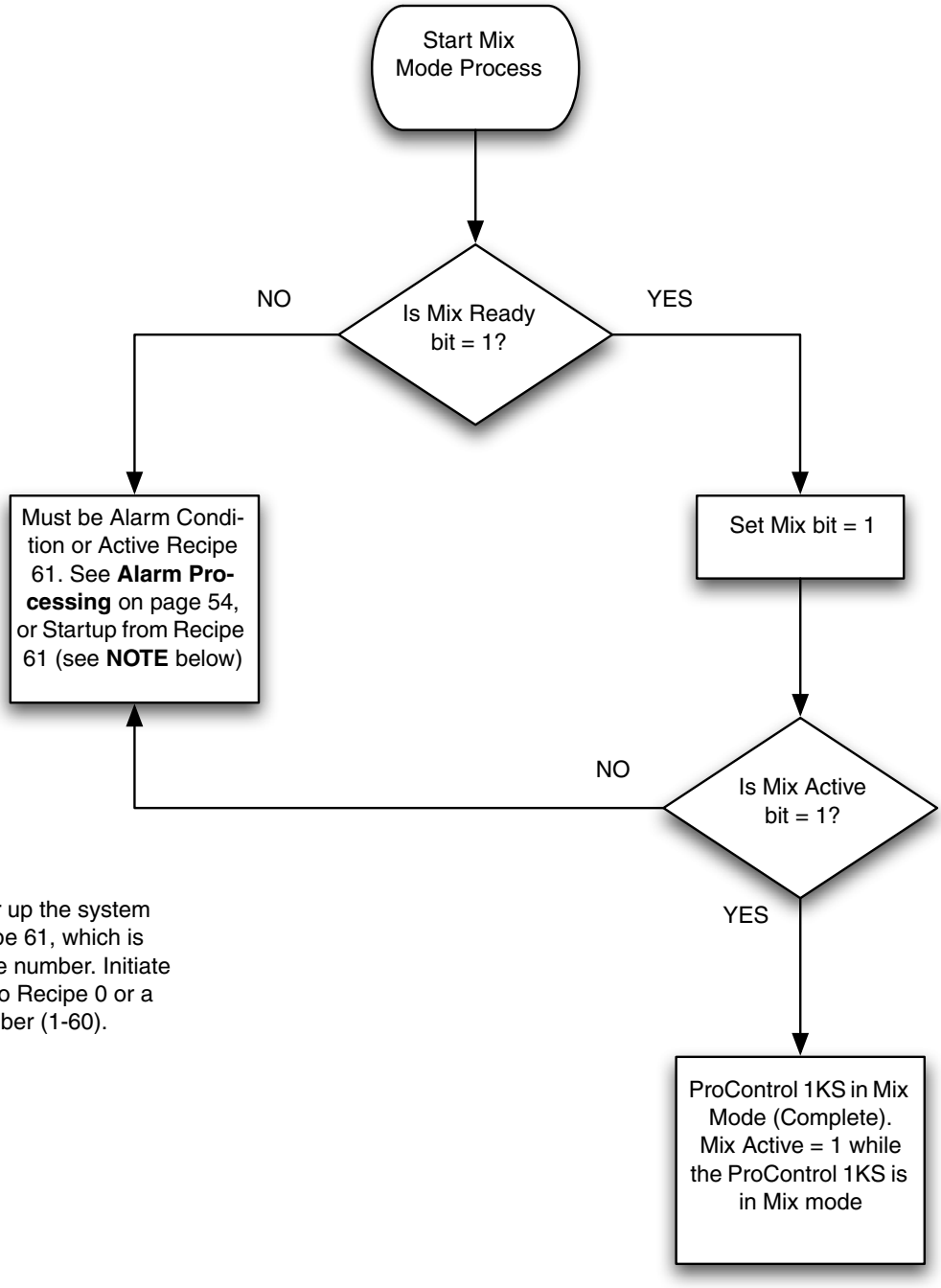
Table 4: Sourcing/Sinking Inputs and Outputs

Inputs (Automation Sourcing)			
1	Flow Control Calibration	Black	+
2	Gun Trigger	White	+
3	Digital In Common	Red	-
4	Remote Stop	Green	+
5	Alarm Reset	Brown	+
Outputs (Automation Sourcing)			
6	Alarm Output	Blue	+
7	Digital Out Common	Orange	-
8	Pot Life	Yellow	+
Outputs (Automation Sinking)			
6	Alarm Output	Blue	-
7	+24 Volts	Orange	+
8	Pot Life	Yellow	-
Automation			
9	Flow Rate Analog In	Purple	+
10	Flow Rate Analog Common	Gray	-

Automation Flow Charts

Start Mix Mode Process

See FIG. 62, Table 5, and Table 6.


Start Mix Mode Process
Is Mix Ready bit = 1?
NO
YES
Must be Alarm Condition or Active Recipe 61. See **Alarm Processing** on page 54, or Startup from Recipe 61 (see **NOTE** below)
Set Mix bit = 1
Is Mix Active bit = 1?
NO
YES
ProControl 1KS in Mix Mode (Complete). Mix Active = 1 while the ProControl 1KS is in Mix mode

NOTE: At power up the system defaults to Recipe 61, which is not a valid recipe number. Initiate a color change to Recipe 0 or a valid recipe number (1-60).

FIG. 62. Start Mix Mode Process Flow Chart

Mixing Mode Process

See FIG. 63, Table 5, and Table 6.

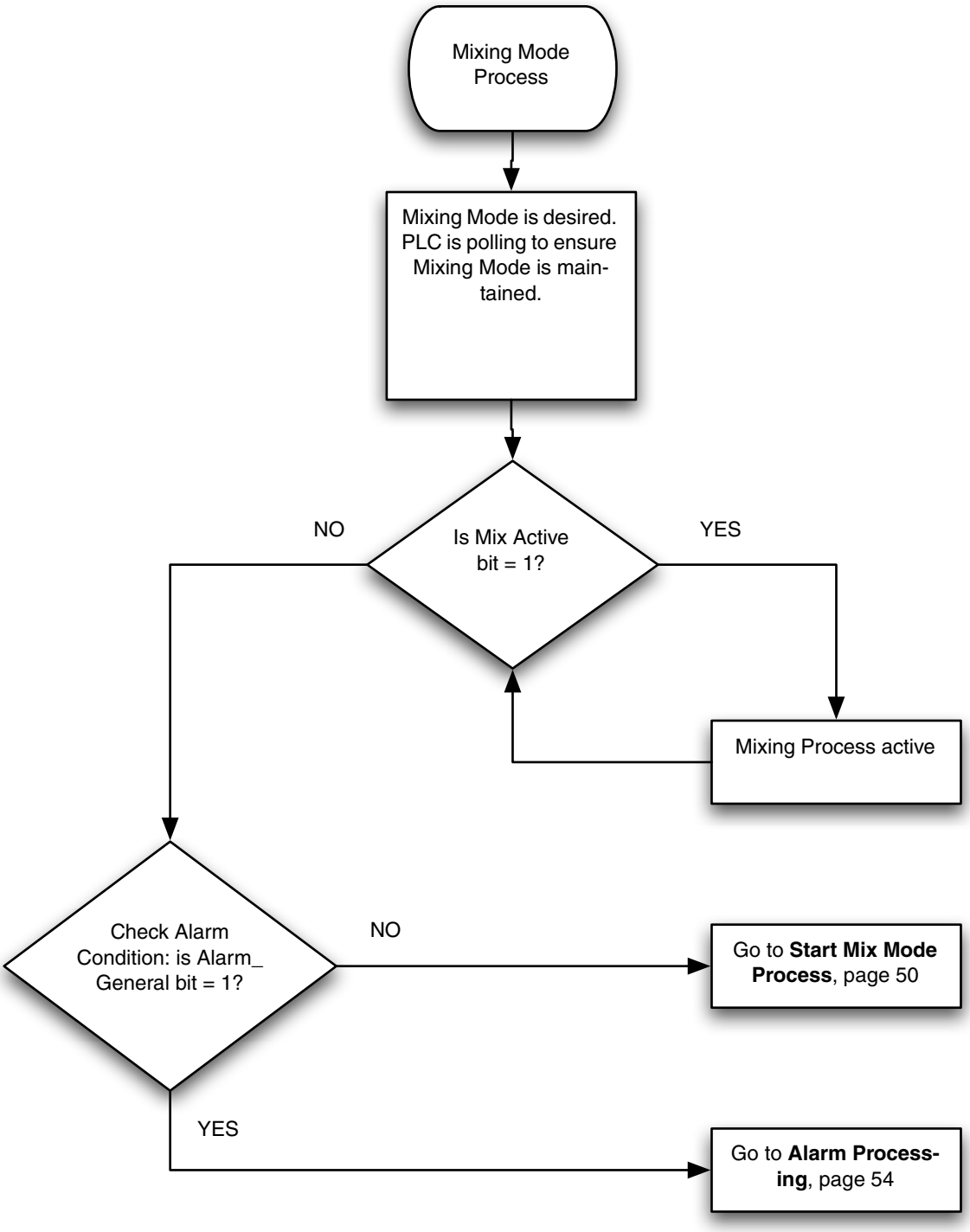
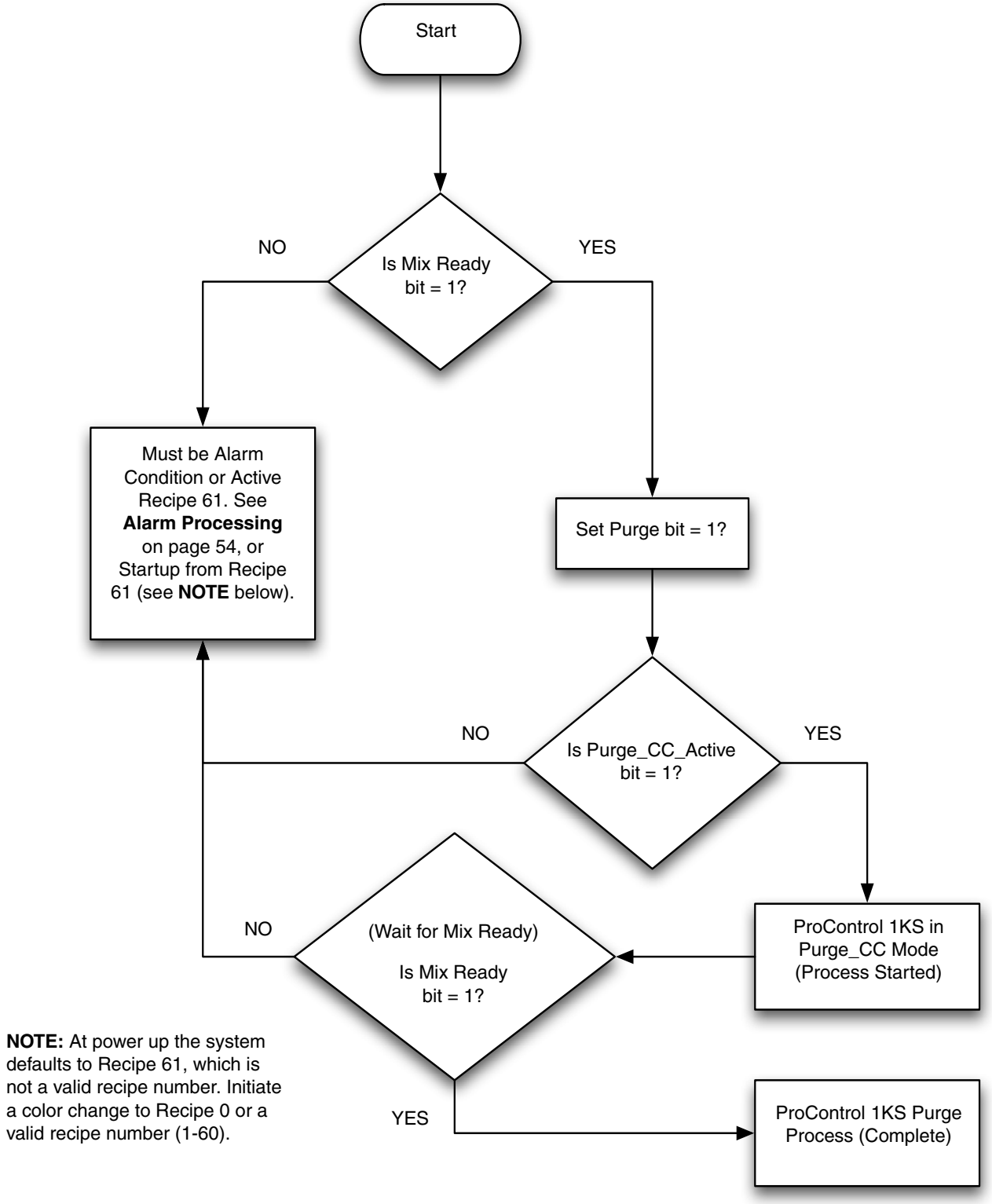

Mixing Mode Process
Mixing Mode is desired. PLC is polling to ensure Mixing Mode is maintained.
Is Mix Active bit = 1?
NO
YES
Mixing Process active
Check Alarm Condition: is Alarm_ General bit = 1?
NO
Go to **Start Mix Mode Process**, page 50
YES
Go to **Alarm Processing**, page 54

FIG. 63. Mixing Mode Process Flow Chart

Purge Mode Process

See FIG. 64, Table 5, and Table 6.


Start
Is Mix Ready bit = 1?
NO
YES
Must be Alarm Condition or Active Recipe 61. See **Alarm Processing** on page 54, or Startup from Recipe 61 (see **NOTE** below).
Set Purge bit = 1?
Is Purge_CC_Active bit = 1?
NO
YES
(Wait for Mix Ready)
Is Mix Ready bit = 1?
NO
ProControl 1KS in Purge_CC Mode (Process Started)
YES
ProControl 1KS Purge Process (Complete)

NOTE: At power up the system defaults to Recipe 61, which is not a valid recipe number. Initiate a color change to Recipe 0 or a valid recipe number (1-60).

FIG. 64. Purge Mode Process Flow Chart

Color Change Mode Process

See FIG. 65, Table 5, and Table 6.

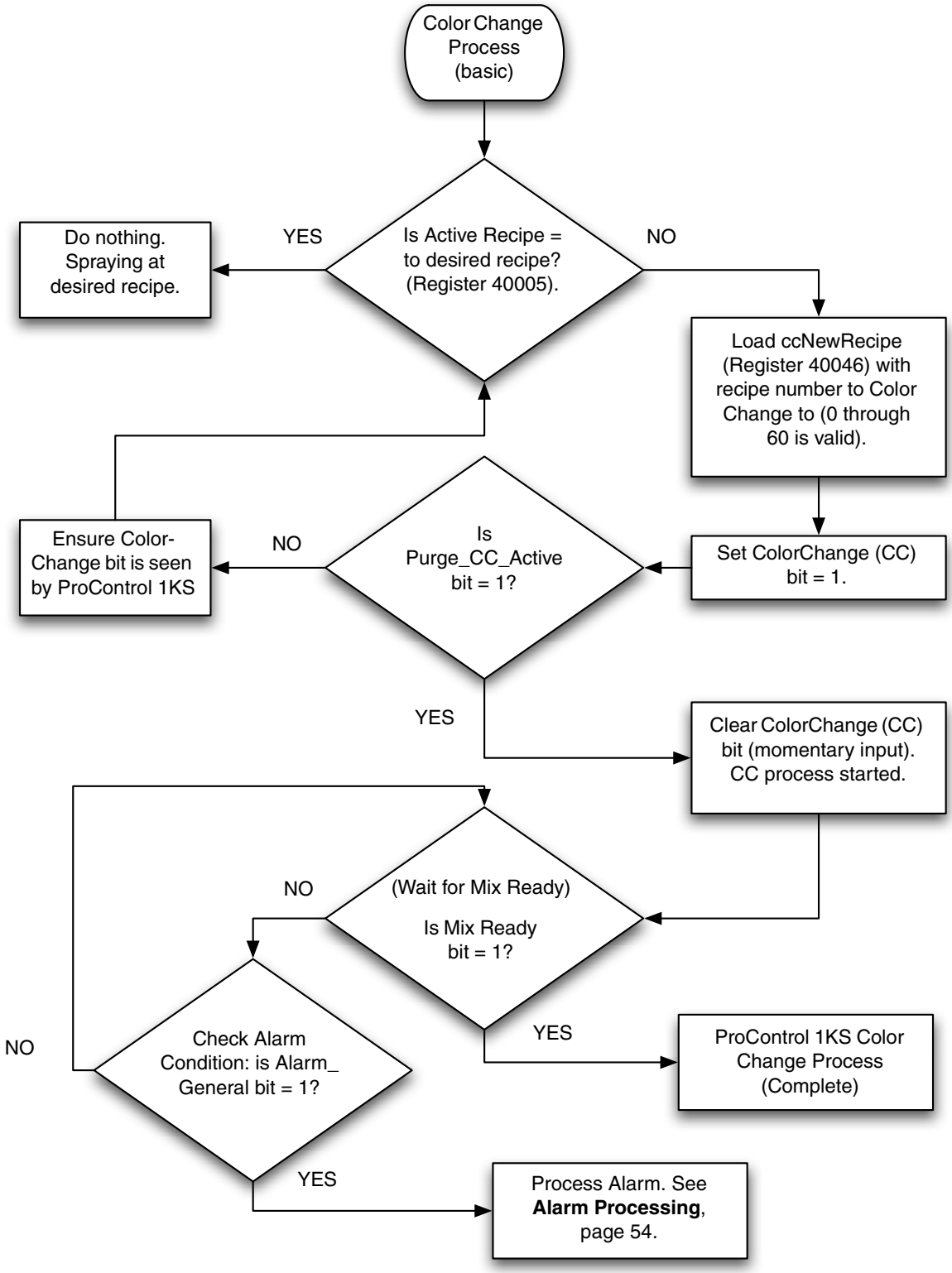

Color Change Process (basic)
Is Active Recipe = to desired recipe? (Register 40005).
YES
Do nothing. Spraying at desired recipe.
NO
Load ccNewRecipe (Register 40046) with recipe number to Color Change to (0 through 60 is valid).
Set ColorChange (CC) bit = 1.
Is Purge_CC_Active bit = 1?
NO
Ensure Color-Change bit is seen by ProControl 1KS
YES
Clear ColorChange (CC) bit (momentary input). CC process started.
(Wait for Mix Ready)
Is Mix Ready bit = 1?
NO
YES
ProControl 1KS Color Change Process (Complete)
Check Alarm Condition: is Alarm_ General bit = 1?
NO
YES
Process Alarm. See **Alarm Processing**, page 54.

FIG. 65. Color Change Mode Process Flow Chart

Alarm Processing

See FIG. 66, Table 5, Table 6, and Table 7.

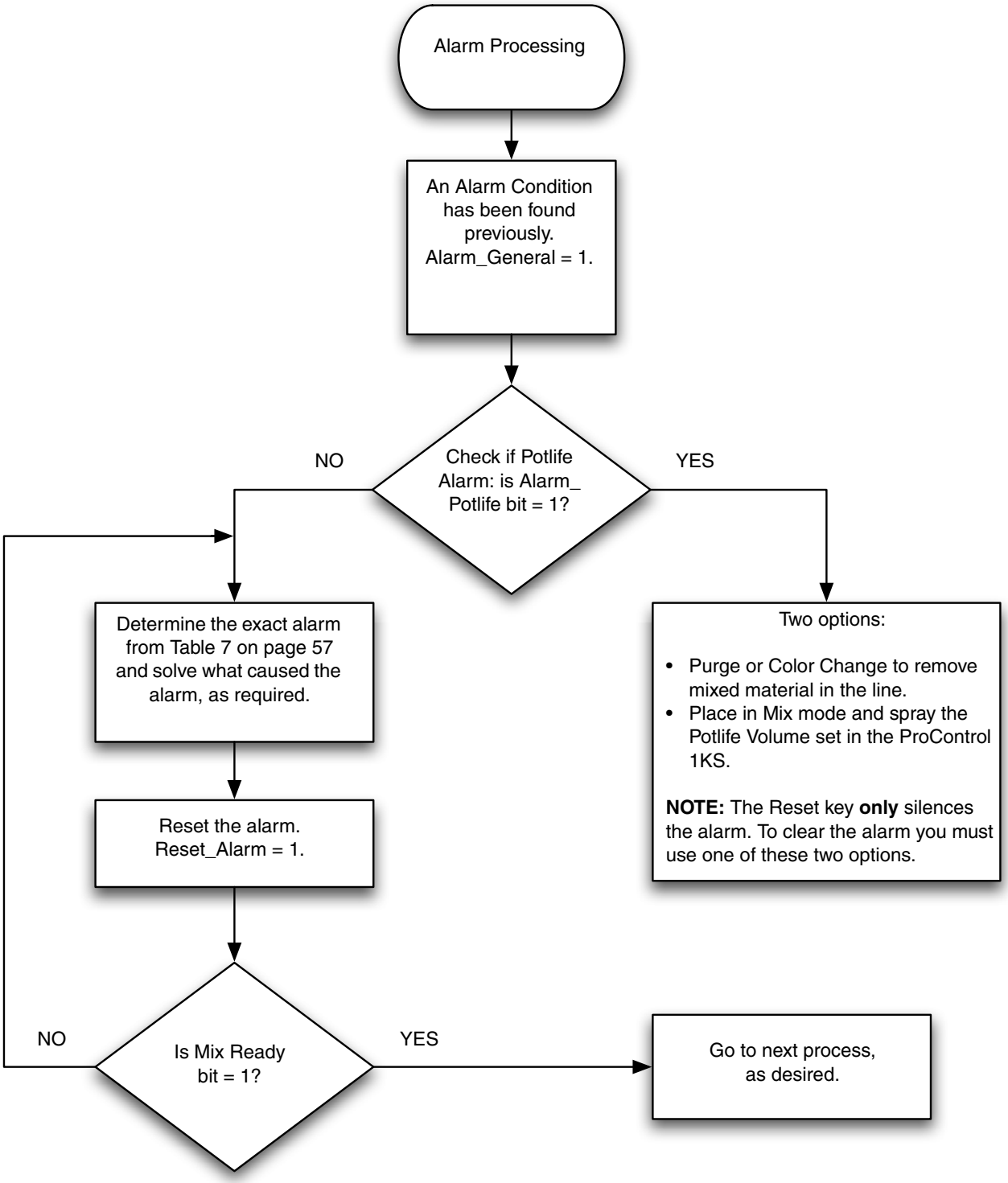

Alarm Processing
An Alarm Condition has been found previously. Alarm_General = 1.
Check if Potlife Alarm: is Alarm_ Potlife bit = 1?
NO
YES
Determine the exact alarm from Table 7 on page 57 and solve what caused the alarm, as required.
Reset the alarm. Reset_Alarm = 1.
Is Mix Ready bit = 1?
NO
YES
Two options:
• Purge or Color Change to remove mixed material in the line.
• Place in Mix mode and spray the Potlife Volume set in the ProControl 1KS.
NOTE: The Reset key only silences the alarm. To clear the alarm you must use one of these two options.
Go to next process, as desired.

FIG. 66. Alarm Processing Flow Chart

Table 5: ProControl 1KS Digital Inputs (Modbus Register 40040)

Bit	Digital Input Binary																Name	Details
0:5	0	0	0	0	0	0	0	0	0	0	X	X	X	X	X	X	Recipe	Binary bits for viewing discrete inputs only.
6	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	Color Change (CC)	Set bit to “1” to initiate Color Change (momentary)
7	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	Mix	Set bit initiate Mix mode (maintain)
8	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	Purge	Set bit to “1” to initiate Purge sequence (maintained)
9	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	Job_Complete	Set bit to “1” to initiate Job Complete input (momentary)
10	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	External CC Ready	Set bit to “1” to initiate External Color Change (momentary)
11	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	Not Used	
12	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	FC _Calibrate	Set bit to “1” to initiate a Flow Control Calibrate input (momentary)
13	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	Gun_Trigger	Set bit to “1” to indicate the gun is actually triggered (maintain while gun is triggered, remove when gun is closed)
14	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Reset_Alarm	Set bit to “1” to clear an active Alarm (momentary)
15	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Remote Stop	Set bit to remotely stop unit (momentary)

NOTE: Shaded cells relate to the flow charts on pages 50-54.

Table 6: ProControl 1KS Digital Outputs (Modbus Register 40041)

Bit	Digital Input Binary																Name	Details
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	Purge_CC_Active	“1” indicates Purge or Color Change is in progress
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	Mix_Active	“1” indicates Mix is in progress
2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	Mix_Ready	“1” indicates No Alarms and OK to Mix
3	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	CC_Fill_Active	“1” indicates the Fill portion of a Color Change is in progress
4	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	FCalActive	“1” indicates the Flow Control Calibrate routine is in progress
5	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	Flow_Rate_Alarm	“1” indicates the Flow Rate Alarm/Warning is active
6	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	Special_1	“1” indicates the Special_1 output is on (monitor only)
7	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	Special_2	“1” indicates the Special_2 output is on (monitor only)
8	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	Special_3	“1” indicates the Special_3 output is on (monitor only)
9	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	Special_4	“1” indicates the Special_4 output is on (monitor only)
10	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	Not Used	
11	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	Not Used	
12	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	Alarm_General	“1” indicates a General Alarm is in process. (If Mix_Active is still High, then a Warning only.) See the Modbus charts in the Graco Gateway manual 312785 for details on type.
13	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	Alarm_Potlife	“1” indicates a Potlife Alarm is in process.

NOTE: Shaded cells relate to the flow charts on pages 50-54.

Table 7: ProControl 1KS Active Alarms (Modbus Register 40010)

Bit	Digital Input Binary	Name	Details
Low Byte: 0	0000 0000 0000 0000	No Bits Set	No Active Alarms
Low Byte: 0	0000 0000 0000 0001	Comm_Error	
Low Byte: 0	0000 0000 0000 0010	Potlife_Alarm	
Low Byte: 0	0000 0000 0000 0100	Ratio_High_Alarm	
Low Byte: 0	0000 0000 0000 1000	Ratio_Low_Alarm	
Low Byte: 0	0000 0000 0001 0000	Overdose_A_Alarm	
Low Byte: 0	0000 0000 0010 0000	Overdose_B_Alarm	
Low Byte: 0	0000 0000 0100 0000	Dose_Time_A_Alarm	
Low Byte: 0	0000 0000 1000 0000	Dose_Time_B_Alarm	
Low Byte: 0	0000 0001 0000 0000	Mix_In_Setup_Alarm	
Low Byte: 0	0000 0010 0000 0000	Remote_Stop_Alarm	
Low Byte: 0	0000 0100 0000 0000	Purge_Volume_Alarm	
Low Byte: 0	0000 1000 0000 0000	CAN_Comm_Error_Alarm	
Low Byte: 0	0001 0000 0000 0000	High_Flow_Alarm	
Low Byte: 0	0010 0000 0000 0000	Low_Flow_Alarm	
Low Byte: 0	0100 0000 0000 0000	System_Idle_Alarm	
Low Byte: 0	1000 0000 0000 0000	Setup_Change_Alarm	
High Byte: 0	0000 0000 0000 0001	Power_On_Alarm	
High Byte: 0	0000 0000 0000 0010	Defaults_Loaded_Alarm	
High Byte: 0	0000 0000 0000 0100	IO_Alarm	
High Byte: 0	0000 0000 0000 1000	Purge_Initiate_Error	
High Byte: 0	0000 0000 0001 0000	Material_Fill_Alarm	
High Byte: 0	0000 0000 0010 0000	Tank_A_Low_Alarm	
High Byte: 0	0000 0000 0100 0000	Tank_B_Low_Alarm	
High Byte: 0	0000 0000 1000 0000	Tank_S_Low_Alarm	
High Byte: 0	0000 0001 0000 0000	Auto_Dump_Complete	
High Byte: 0	0000 0010 0000 0000	Color/Catalyst_Purge_Alarm	
High Byte: 0	0000 0100 0000 0000	Color/Catalyst_Fill_Alarm	
High Byte: 0	0000 1000 0000 0000	Num_Alarm_Desc	
High Byte: 0	0001 0000 0000 0000	Spare3_Alarm	
High Byte: 0	0010 0000 0000 0000	Spare2_Alarm	
High Byte: 0	0100 0000 0000 0000	Spare1_Alarm	
High Byte: 0	1000 0000 0000 0000	Potlife_Buzzer	

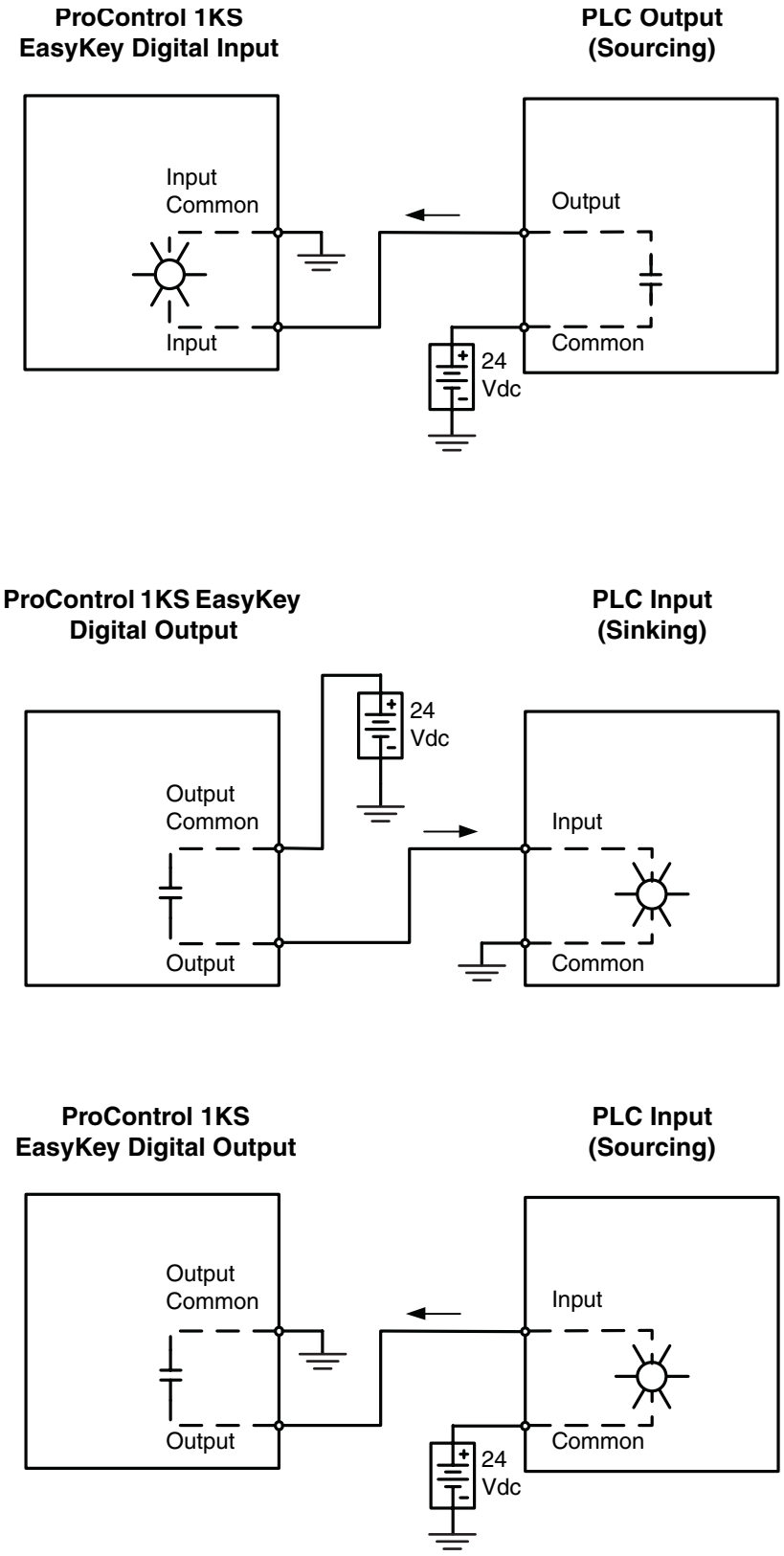


FIG. 67. Automation 24 Vdc Sourcing Input Diagram

Table 8: Discrete I/O Terminal Connections

Terminal	Terminal Location	Name	Details (also see pages 55 and 56)
Digital Inputs			
1	J2, Remote I/O Board	Mix	Set Bit to Initiate Mix Mode (maintain)
2	J2, Remote I/O Board	Purge	Set Bit to “1” to initiate Purge Sequence (maintained)
3	J2, Remote I/O Board	Job_Complete	Set Bit to “1” to initiate Job Complete Input (momentary)
4	J2, Remote I/O Board	External CC Ready	Set Bit to “1” to initiate External Color Change (maintained)
5	J2, Remote I/O Board	Spare	
6*	J2, Remote I/O Board	Digital Input Common	
1*	J3, Remote I/O Board	Digital Input Common	
2	J3, Remote I/O Board	Recipe Bit 0	Set Binary Bits for Recipe to Change To (hold until changing again)
3	J3, Remote I/O Board	Recipe Bit 1	Set Binary Bits for Recipe to Change To (hold until changing again)
4	J3, Remote I/O Board	Recipe Bit 2	Set Binary Bits for Recipe to Change To (hold until changing again)
5	J3, Remote I/O Board	Recipe Bit 3	Set Binary Bits for Recipe to Change To (hold until changing again)
6	J3, Remote I/O Board	Recipe Bit 4	Set Binary Bits for Recipe to Change To (hold until changing again)
7	J3, Remote I/O Board	Recipe Bit 5	Set Binary Bits for Recipe to Change To (hold until changing again)
8	J3, Remote I/O Board	Color Change (CC)	Set Bit to “1” to initiate Color Change (momentary)
1	10 Pin Terminal Block	Flow Control Calibrate	Set Bit to “1” to initiate Flow Control Calibrate (momentary)
2	10 Pin Terminal Block	Gun Trigger	Set Bit to “1” to indicate Gun is Triggered (fluid flow expected)
3†	10 Pin Terminal Block	Digital Input Common	
4	10 Pin Terminal Block	Remote Stop	Set Bit to “1” to initiate a Remote Stop (momentary)
5	10 Pin Terminal Block	Reset_Alarm	Set Bit to “1” to Clear an Active Alarm (momentary)

* *Digital inputs tied together on the I/O board (see FIG. 61).*

† *Digital inputs tied together on the EasyKey Display Board (see FIG. 59).*

Multiple connection points for convenience.

Table 8: Discrete I/O Terminal Connections

Terminal	Terminal Location	Name	Details (also see pages 55 and 56)
Digital Outputs			
1★	J4, Remote I/O Board	Digital Output Common/Power	
2	J4, Remote I/O Board	Purge_CC Active	"1" Indicates Purge or Color Change is in progress
3	J4, Remote I/O Board	Mix_Active	"1" Indicates Mix is in progress
4	J4, Remote I/O Board	Mix_Ready	"1" Indicates No Alarms and OK to Mix
5	J4, Remote I/O Board	CC_Fill_Active	"1" Indicates the Fill Portion of a Color Change is in progress
6	J4, Remote I/O Board	FCalActive	"1" Indicates the Flow Control Calibrate routine is in progress
7	J4, Remote I/O Board	Flow_Rate	"1" Indicates the Flow Rate Alarm/Warning is active
8★	J4, Remote I/O Board	Digital Output Common/Power	
1★	J5, Remote I/O Board	Digital Output Common/Power	
2	J5, Remote I/O Board	Special_1	"1" Indicates the Special_1 Output is on
3	J5, Remote I/O Board	Special_2	"1" Indicates the Special_2 Output is on
4	J5, Remote I/O Board	Special_3	"1" Indicates the Special_3 Output is on
5	J5, Remote I/O Board	Special_4	"1" Indicates the Special_4 Output is on
6★	J5, Remote I/O Board	Digital Output Common/Power	
6	10 Pin Terminal Block	General Alarm Output	"1" Indicates the General Alarm Output is on
7◆	10 Pin Terminal Block	Digital Output Common/Power	
8	10 Pin Terminal Block	Potlife Alarm	"1" Indicates the Potlife Alarm Output is on
9	10 Pin Terminal Block	Flow Rate Analog In (0-10 VDC)	0 - 10VDC input for Flow Setpoint relative to flow range set in 2KS Flow Range Screen
10	10 Pin Terminal Block	Flow Rate Common to Pin 9	Common side of Flow Setpoint from Terminal 9
Communications			
1	6 Pin Terminal Block	RS485 Integration A	Communication to External PLC/Controller
2	6 Pin Terminal Block	RS485 Integration B	
3	6 Pin Terminal Block	RS485 Integration Shield/Ground	
4	6 Pin Terminal Block	RS485 Network A	Communication to Multiple EasyKeys **only**
5	6 Pin Terminal Block	RS485 Network B	
6	6 Pin Terminal Block	RS485 Network Shield/Ground	

★ *Digital outputs tied together on the I/O board (see FIG. 61).*

◆ *Digital outputs tied together on the EasyKey Display Board (see FIG. 59).*

Multiple connection points for convenience.

Table 9: ProControl 1KS Recipe Bits

Recipe Bits						Number
5	4	3	2	1	0	
0	0	0	0	0	0	0
0	0	0	0	0	1	1
0	0	0	0	1	0	2
0	0	0	0	1	1	3
0	0	0	1	0	0	4
0	0	0	1	0	1	5
0	0	0	1	1	0	6
0	0	0	1	1	1	7
0	0	1	0	0	0	8
0	0	1	0	0	1	9
0	0	1	0	1	0	10
0	0	1	0	1	1	11
0	0	1	1	0	0	12
0	0	1	1	0	1	13
0	0	1	1	1	0	14
0	0	1	1	1	1	15
0	1	0	0	0	0	16
0	1	0	0	0	1	17
0	1	0	0	1	0	18
0	1	0	0	1	1	19
0	1	0	1	0	0	20
0	1	0	1	0	1	21
0	1	0	1	1	0	22
0	1	0	1	1	1	23
0	1	1	0	0	0	24
0	1	1	0	0	1	25
0	1	1	0	1	0	26
0	1	1	0	1	1	27
0	1	1	1	0	0	28
0	1	1	1	0	1	29
0	1	1	1	1	0	30
0	1	1	1	1	1	31
1	0	0	0	0	0	32

Recipe Bits						Number
5	4	3	2	1	0	
1	0	0	0	0	1	33
1	0	0	0	1	0	34
1	0	0	0	1	1	35
1	0	0	1	0	0	36
1	0	0	1	0	1	37
1	0	0	1	1	0	38
1	0	0	1	1	1	39
1	0	1	0	0	0	40
1	0	1	0	0	1	41
1	0	1	0	1	0	42
1	0	1	0	1	1	43
1	0	1	1	0	0	44
1	0	1	1	0	1	45
1	0	1	1	1	0	46
1	0	1	1	1	1	47
1	1	0	0	0	0	48
1	1	0	0	0	1	49
1	1	0	0	1	0	50
1	1	0	0	1	1	51
1	1	0	1	0	0	52
1	1	0	1	0	1	53
1	1	0	1	1	0	54
1	1	0	1	1	1	55
1	1	1	0	0	0	56
1	1	1	0	0	1	57
1	1	1	0	1	0	58
1	1	1	0	1	1	59
1	1	1	1	0	0	60

System Operation

Operation Modes

Mix

System mixes and dispenses material (apply Mix input).

Standby

Stops the system (remove Mix input).

Purge

Purges the system, using air and solvent (apply Purge input).

Recipe (Color) Change

The process when the system automatically flushes out the old color and loads a new color. See pages 78-89.

Flow Control

NOTE: Flow control is not available with dynamic dosing.

Flow control is an optional feature of the ProControl 1KS automatic system. Flow control regulates the flow of material to a manual or automatic air spray gun, to help ensure adequate coverage and avoid sags or runs in the finish coat. It is not for use with air-assisted or airless spray guns.

See FIG. 68. The flow regulator (FC) is required to use flow control in your system. Connect the fluid inlet and outlet lines, air line, and cable as shown.

Set Flow Control to “On” in **Configure Screen 5** on page 31. Make the desired selections in **Advanced Setup Screen 5**, page 37.

See the Graco Gateway manual 312785 for Flow Control Modbus addresses.

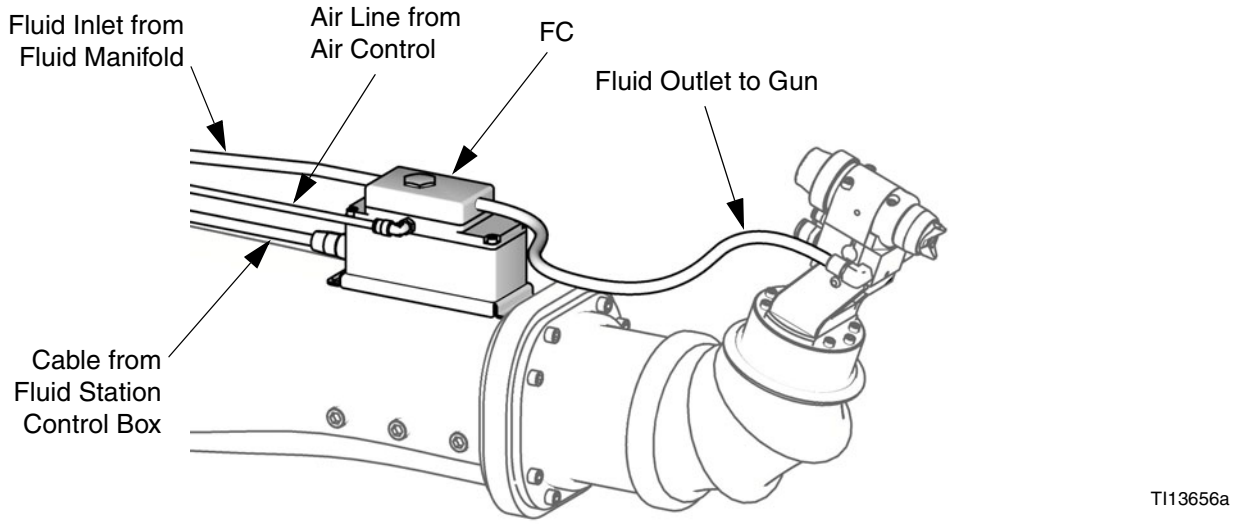


FIG. 68. Flow Control Regulator

Typical PLC Interaction with ProControl 1KS

This section describes a typical interaction when a local PLC is directly connected to the Discrete I/O connections of the ProControl 1KS.

See **ProControl 1KS Integration Specifics** on page 45 for a detailed explanation of inputs and outputs.

NOTE: Communications fields of **Configure Screen 6** must be set to DISCRETE (see page 31).

Start Mixing

To start the mix process, the PLC will monitor and ensure the Mix_Ready output is High. This provides assurance it is ready to mix. PLC will drive High the Mix_Start input, keep it High and monitor the Mix_Active output to ensure the ProControl 1KS followed through on the request.

Stop Mixing

To stop mixing (to perform a purge or color change), remove the Mix_Start input (the status bar on the EasyKey will show STANDBY). Monitor the Mix_Ready output to ensure the Mix_Active output goes Low.

Color Change

To perform a color change, ensure there are no alarms (except the Potlife Alarm). If alarms are present, the Alarm_Reset input should be sent momentarily to clear the alarm (>100 msec).

NOTE: Alarm_Reset will not reset a Potlife alarm. Only dispensing the Potlife Volume or a complete Purge/Color Change will reset a Potlife alarm.

The Alarm Reset Input will silence the audible alarm. Turn the Color_Change_Start input on momentarily (>100 msec) while the proper sequence of recipe bits are set.

NOTE: The Recipe Bits must be presented at least 100 msec before the Color Change Start input is turned on and remain until a new recipe is required.

During the short On state, the recipe will be read from this binary sequence and the status bar of the EasyKey will display COLOR CHANGE XX. The Purge_CC_Active output will be High for the duration of the color change purge process. During the Mixed Material Load portion at the end of the Color Change sequence, the Fill_Active output will be on, indicating that portion of the color change. These will not be on at the same time. Once the Mix_Ready output goes High with no alarms, then the PLC has assurance that the requested color change has taken place with the requested recipe being the current active recipe. If any error occurs during the process, the requested recipe will not be loaded, and the old recipe will remain active.

NOTE: It is not possible to read the active recipe through Discrete I/O alone. Only by monitoring networked registers through the Gateway is it possible to view the active recipe. Proper management of the alarm status outputs during the color change process will ensure the active recipe is what is expected.

Purge

To start a Purge (no color change), drive the Purge_Start input High (maintained) while ensuring Mix_Ready output is High (ensuring no active alarms). An exception is Potlife alarm (see **Color Change** above if alarms are present.) The Purge_CC_Active output is High for the entire Purge process. Ensure there are no alarms during this process. Fill_Active is High when Mix is on. When complete, Mix _Ready output will be High, indicating a completed purge.

NOTE: No change is made to the active recipe.

Gun Trigger Input

This input is sent and expected every time the gun is actually triggered, and this input is turned off when the gun is not triggered. Never tie this input with any other signal. Without this input, some critical mixing alarms are eliminated. This input should be provided through Discrete I/O only for flow control applications to ensure fast coordination with the flow control process. Applications without integrated flow control can use Gun Trigger input through Network Communications or Discrete I/O.

NOTE: This has the same effect as the air flow switch used on manual ProControl 1KS systems.

Alarm Monitoring/Reset (Discrete I/O)

Anytime an alarm occurs, the Alarm Reset input will reset the alarms and allow for processing of the next step by automation, ***except for the following conditions:***

- Potlife Alarms ***cannot*** be reset by the Alarm Reset input or through the EasyKey Alarm Reset key. Only a Purge/Color Change or spraying the Potlife volume will reset a Potlife alarm. (See Alarm_Potlife output information on page 49.)

- When Flow Control is turned on (see **Configure Screen 5** on page 31), the Flow_Rate_Alarm output will be High when the instantaneous flow rate is above or below the Flow Rate tolerance setting. (High Flow or Low Flow will be the condition, indicating in the status bar of the EasyKey.) This output will be High along with the Mix_Active output. The PLC should monitor the amount of time this condition exists and take action at a predetermined time. With Flow Control there will be times (for example during flow rate changes) where the general alarm as described here will be High (typically momentarily). The PLC must read this Alarm output (i.e. general alarm), see if Mix_Active is still High, and if so, start a timer. A typical example would be to ensure all parts are sprayed within a specific flow rate range. A maximum predetermined time would be set to allow a Low or High flow condition to exist continuously.

- Shutdown or go to Standby after the flow rate alarm time expires.

Job_Complete Input

Every time a momentary Job_Complete input is seen by the ProControl 1KS, a job log will be recorded, logging the A meter volume (cc) with a time and date stamp. The volume will then be reset to 0. (Volume totals are accumulated since the last reset.)

NOTE: A Color Change accomplishes the same Job Complete Reset functions. The Job_Complete input is commonly used to record material usage for a specific set of parts. These volumes are sprayed material volumes.

For Applications with Dump Valves (for quick purges/color changes at or near the gun):

ProControl 1KS has four specials that can each be turned off and on twice throughout a color change sequence. See **Advanced Setup Screen 8** on page 38 or **Recipe Setup Screen 7** on page 42.

For example, a dump valve at a gun on a robot could be opened at the appropriate times to facilitate fast color changes. Another output could be used to automatically drive an air-operated fluid regulator High during the Purge or Color Change process.

NOTE: With integrated Flow Control, the flow control regulator automatically is driven High. See **Advanced Setup Screen 5** on page 37 for specifics on setting up these values. Each of the specials can be monitored, but can only be controlled through the times entered within the setup screens of the EasyKey or by managing the proper registers on the network.

The following ProControl 1KS inputs should ***never*** be on (High) at the same time:

- Mix_Start

- Purge_Start

- Color_Change_Start

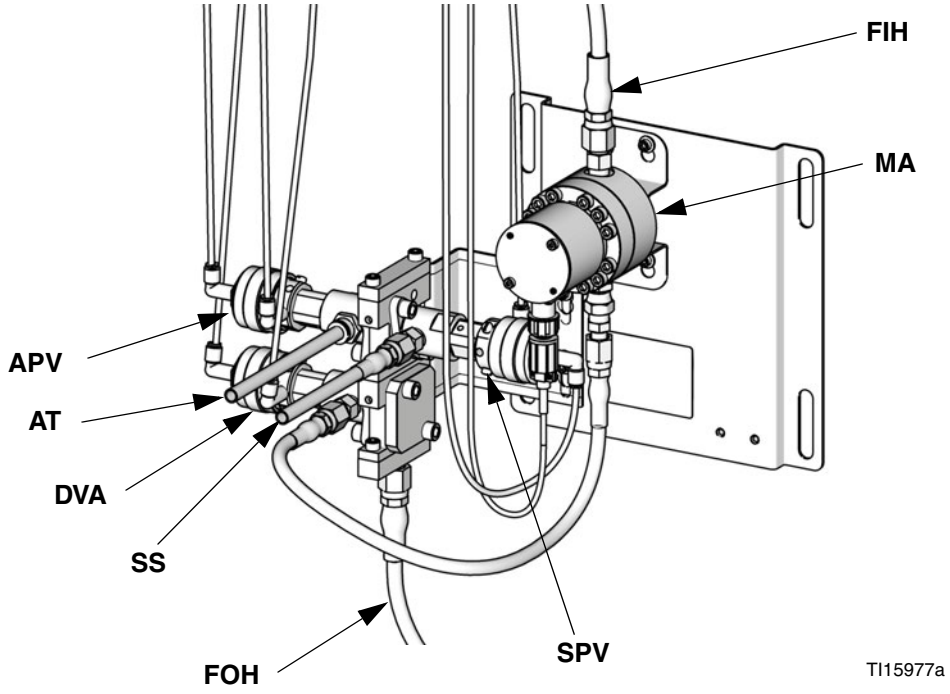
The Recipe Bits (0-6) are always on at the same time. The only time these bits are recognized is when the Color_Change_Start input is High. The Recipe Bits should be loaded and ***stay loaded*** for the current recipe. Do not change the Recipe Bits until a color change is required again. Inconsistent results are possible if this is not followed.

General Operating Cycle

1. The system enters and loads the desired color.
2. The system enters Mix mode to begin operation.
3. The ProControl 1KS controller sends signals to activate the solenoid valves. The solenoid valves activate Dose Valve A. Fluid flow begins when the Gun Trigger input is seen.
4. Dose Valve A (DVA) opens, and fluid flows to the gun.
5. Flow Meter A (MA) monitors the fluid volume dispensed and sends electrical pulses to the ProControl 1KS controller. The controller monitors these pulses and signals.
6. When the target volume dispenses, Dose Valve A closes.

   NOTE: The dispense volume of component A is based on the mix ratio and dose size set by the user and calculated by the ProControl 1KS controller.
7. Component A is fed to the gun as long as the Gun Trigger input is seen.
8. If the Gun Trigger input is not seen for two minutes, the system switches to Idle mode, which closes off the mix manifold dose valve.
9. When the Gun Trigger input is seen again, the ProControl 1KS continues the process where it left off.

   NOTE: Operation can be stopped at any time by going to Standby mode (remove Mix input).



Key:

MA	Component A Meter
DVA	Component A Dose Valve
SPV	Solvent Purge Valve
SS	Solvent Purge Valve Solvent Supply Tube
APV	Air Purge Valve
AT	Air Purge Valve Air Supply Tube
FIH	Fluid Inlet Hose
FOH	Fluid Outlet Hose

FIG. 69. Fluid Manifold

Mix Manifold Valve Settings

To open dose or purge valves, turn hex nut (E) *counter-clockwise*. To close, turn *clockwise.* See Table 10 and FIG. 70.

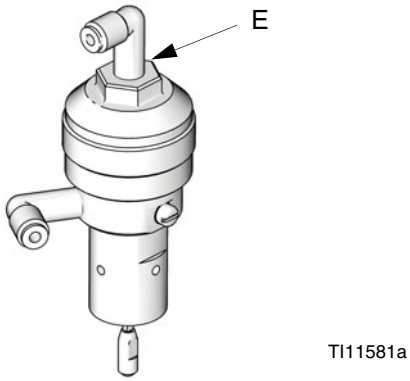


FIG. 70. Valve Adjustment

Table 10: Mix Manifold Valve Settings

Valve	Setting	Function
Dose (see FIG. 70)	Hex nut (E) 1-1/4 turns out from fully closed	Limits maximum fluid flow rate into integrator and minimizes valve response time.
Purge (see FIG. 70)	Hex nut (E) 1-1/4 turns out from fully closed	Limits maximum fluid flow rate into integrator and minimizes valve response time.

Start Up

1. Go through the Pre-Operation Checklist in Table 11.

Table 11: Pre-Operation Checklist

✓	Checklist
	System grounded Verify all grounding connections were made. See the Installation manual.
	All connections tight and correct Verify all electrical, fluid, air, and system connections are tight and installed according to the Installation manual.
	Fluid supply containers filled Check component A and solvent supply containers.
	Mix manifold valves set Check that mix manifold valves are set correctly. Start with the settings recommended in **Mix Manifold Valve Settings**, page 66, then adjust as needed.
	Fluid supply valves open and pressure set
	Solenoid pressure set 75-100 psi inlet air supply (0.5-0.7 MPa, 5.2-7 bar)

2. Turn the AC Power Switch ON (I = ON, 0 = OFF).

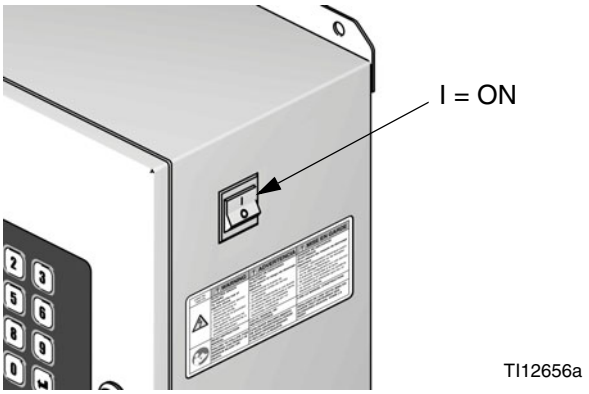


FIG. 71. Power Switch

➜ Graco logo, software revision, and “Establishing Communication” will display, followed by Status screen. See page 19.

➜ At power up the system defaults to Recipe 61, which is not a valid recipe number. Initiate a color change to Recipe 0 or a valid recipe number (1-60).

➜ In bottom left corner, the system status displays, which can be Standby, Mix, Purge, or an alarm notification.

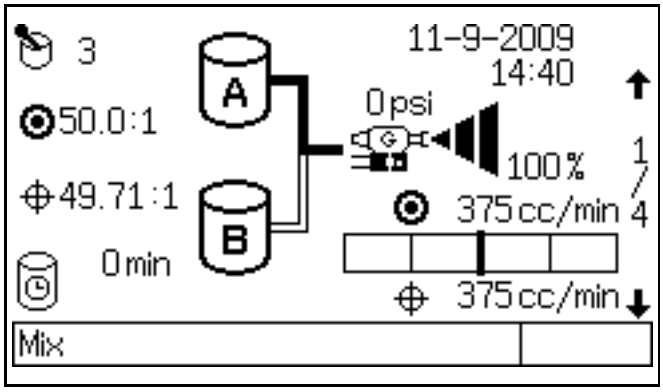


FIG. 72. Status Screen

3. Verify that the EasyKey is working. The active recipe number and Standby mode should be displayed.

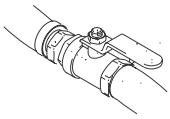
4. If this is the first time starting up the system, purge it as instructed in **Purging Fluid Supply System**, page 74. The equipment was tested with lightweight oil, which should be flushed out to avoid contaminating your material.

5. Make sure that the EasyKey is in Standby (remove Mix input)**.**

6. Adjust component A fluid supply as needed for your application. Use lowest pressure possible.

7. Do not exceed the maximum rated working pressure shown on the system identification label or the lowest rated component in the system.

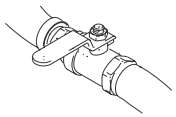
8. Open the fluid supply valves to the system.



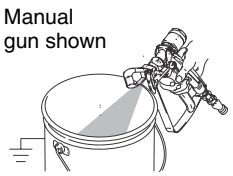
9. Adjust the air pressure. Most applications require about 80 psi (552 kPa, 5.5 bar) air pressure to operate properly. Do not use less than 75 psi (517 kPa, 5.2 bar).

10. Purge air from the fluid lines.

    a. Shut off air to the gun by closing the air regulator or shutoff valve for the gun atomizing air.

    b. Trigger the gun (manual or automatic) into a grounded metal pail.

    c. Go to Mix mode.

    d. If the flow meters over-run because of air in the system, an alarm will occur and operation stops.

    Press the Alarm Reset key to clear alarm.

    e. Go to Mix mode.

11. Adjust the flow rate.

    The fluid flow rate is shown on the EasyKey Status screen. The fluid supply lines on the screen highlight when the dose valve is open.

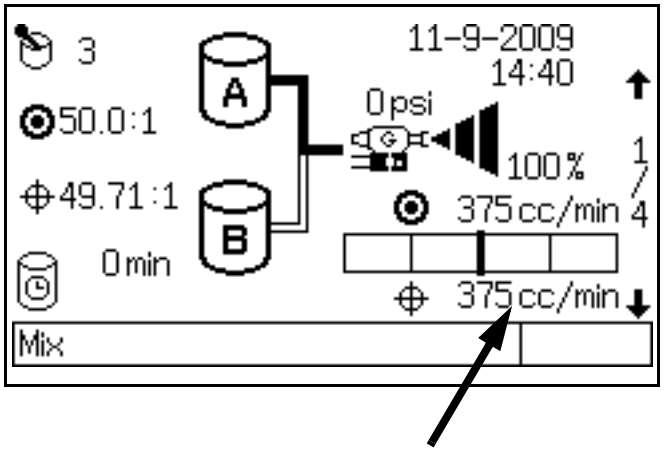


FIG. 73. Status Screen Flow Rate Display

    Watch the fluid flow rate displayed on the Status screen while the gun is fully open.

    If the fluid flow rate is too low: increase air pressure to the fluid supply or increase the regulated fluid pressure.

    If the fluid flow rate is too high: reduce the air pressure, close the fluid manifold dose valves further, or adjust the fluid pressure regulator.

NOTE: Pressure adjustments of each component will vary with fluid viscosity. Adjust as needed.

12. Turn on atomizing air to the gun. Check the spray pattern as instructed in your spray gun manual.

NOTE: Do not allow a fluid supply tank to run empty. It is possible for air flow in the supply line to turn gear meters in the same manner as fluid. This can lead to the mixing of fluid and air that meets the ratio and tolerance settings of the equipment.

Shutdown

Overnight Shutdown

1. Leave the power on.
2. Run Recipe 0 to purge solvent through meters and gun.

Service Shutdown

1. Follow **Pressure Relief Procedure** on page 69.
2. Close main air shutoff valve on air supply line and on ProControl 1KS.
3. Shut off ProControl 1KS power (0 position). FIG. 74.
4. If servicing EasyKey, also shut off power at main circuit breaker.

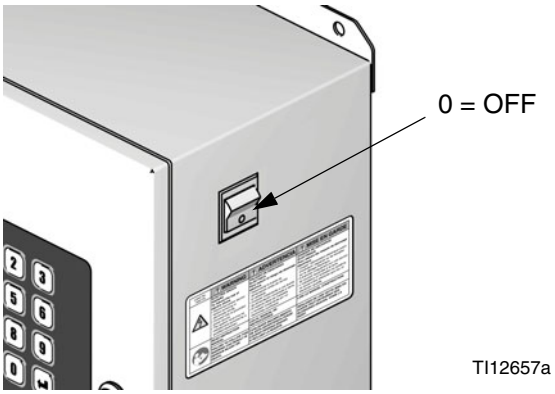


FIG. 74. Power Switch

Pressure Relief Procedure

NOTE: The following procedures relieve all fluid and air pressure in the ProControl 1KS system. Use the procedure appropriate for your system configuration.

Relieve pressure when you stop spraying, before changing spray tips, and before cleaning, checking, or servicing equipment.

Single Color Systems

1. While in Mix mode (gun triggered), shut off the fluid supply pumps/pressure pots. Close all fluid shutoff valves at the pump outlets.
2. With the gun triggered, push the manual override on the A dose valve solenoid to relieve pressure. See FIG. 75.

   NOTE: If a Dose Time alarm (E-7, E-8) occurs, clear the alarm.
3. Do a complete system purge, following the instructions under **Purging Using Recipe 0**, page 74.
4. Shut off the fluid supply to the solvent purge valve (SPV) and the air supply to the air purge valve (APV), FIG. 77.
5. With the gun triggered, push the manual override on the A purge valve solenoid to relieve air and solvent pressure. See FIG. 75. Verify that solvent pressure is reduced to 0.

   NOTE: If a Purge Volume alarm (E-11) occurs, clear the alarm.

Systems with Color Change and Dump Valves

NOTE: This procedure relieves pressure through the dump valves.

1. Complete all steps under **Single Color Systems**, page 69.
2. Shut off all color and catalyst supplies to the valve stacks.
3. Press and hold the dump valve A solenoid override, FIG. 75.
4. See FIG. 76. Open the color change module. Using the solenoid identification labels as a guide, press and hold the override button on each color solenoid until flow from dump valve A stops.
5. Press and hold the dump valve A solenoid override, FIG. 75.
6. Press and hold the A side (color) solvent solenoid override until clean solvent comes from the dump valve, then release.
7. Shutoff the solvent supply to the color/catalyst change stack solvent valves.
8. Press and hold the A solvent solenoid override and dump valve override until solvent flow from the dump valve stops.

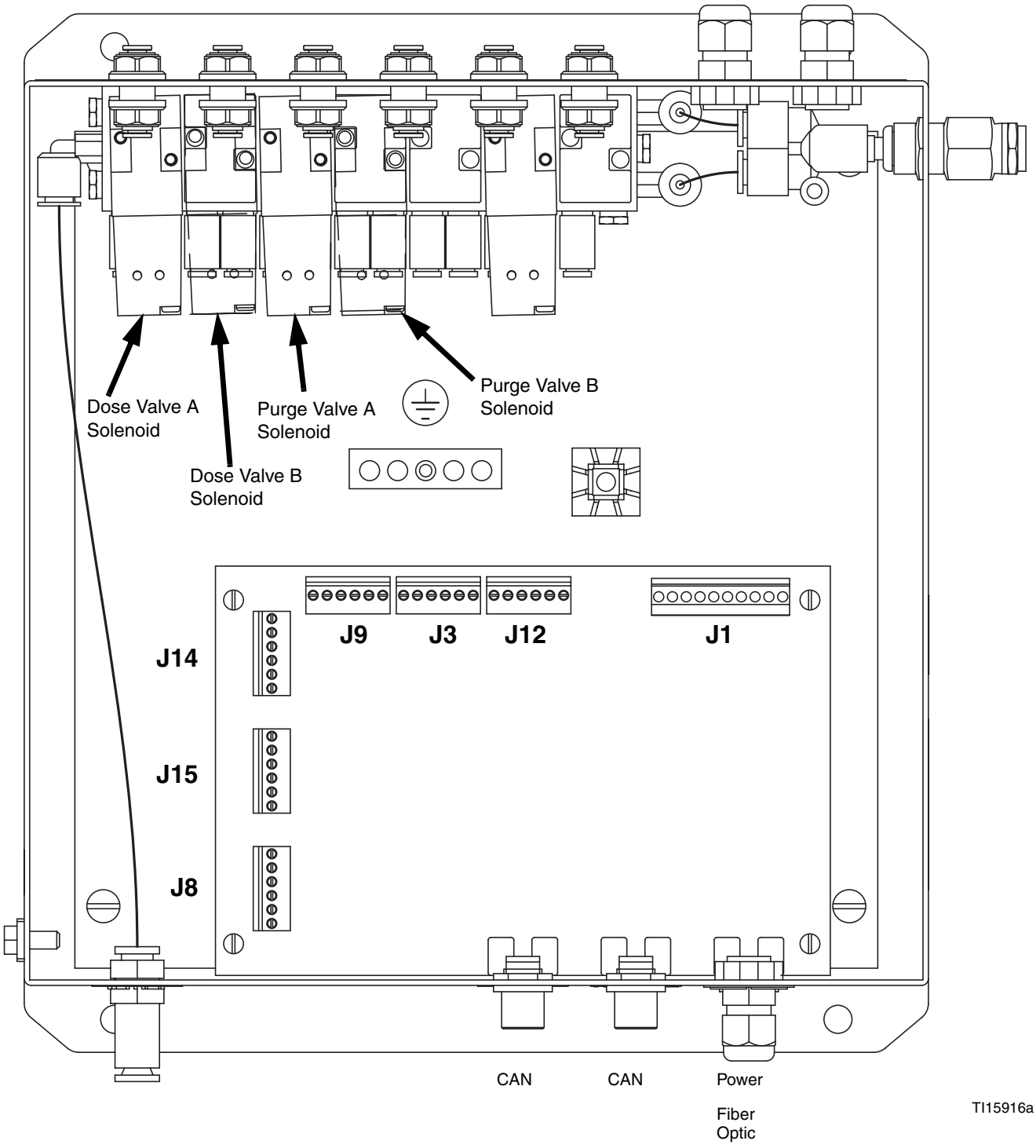


FIG. 75. Fluid Solenoids

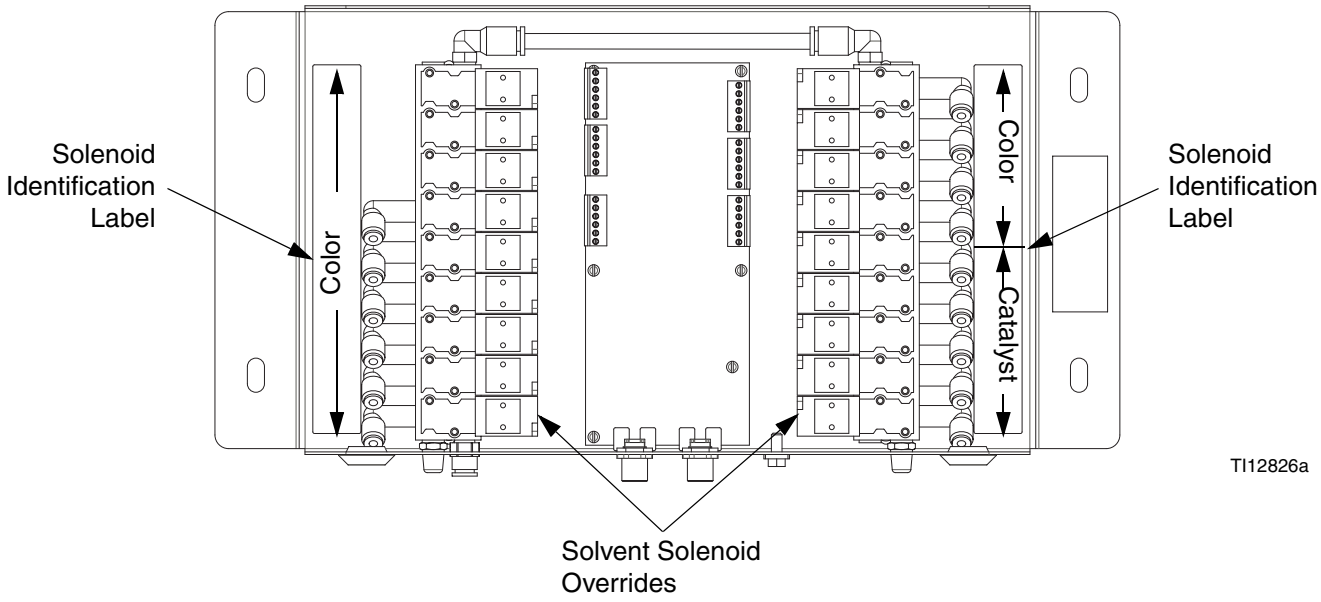
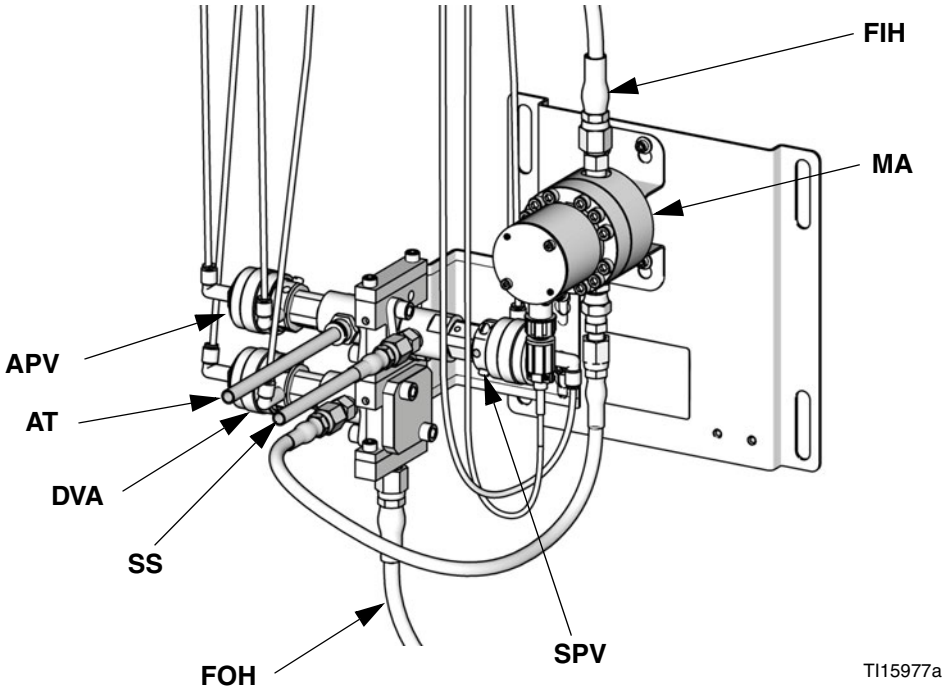


FIG. 76: Color Change Solenoids

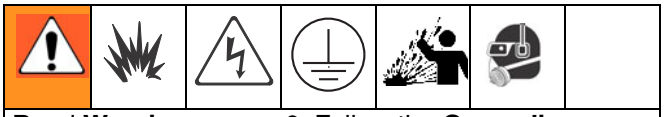


Key:

MA	Component A Meter
DVA	Component A Dose Valve
SPV	Solvent Purge Valve
SS	Solvent Purge Valve Solvent Supply Tube
APV	Air Purge Valve
AT	Air Purge Valve Air Supply Tube
FIH	Fluid Inlet Hose
FOH	Fluid Outlet Hose

FIG. 77. Fluid Manifold

Purging



Read **Warnings**, page 6. Follow the **Grounding** instructions in your system Installation manual.

To avoid splashing fluid in the eyes, wear eye protection.

There are 4 purging procedures in this manual:

- **Purging Mixed Material** (below)
- **Purging Using Recipe 0** (page 74)
- **Purging Fluid Supply System** (page 74)

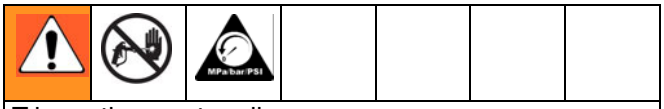
Use the criteria listed in each procedure to determine which procedure to use.

Purging Mixed Material

There are times when you only want to purge the fluid manifold, such as:

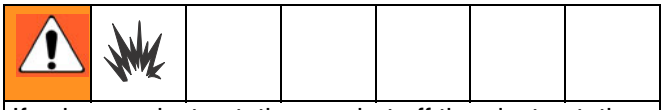
- end of potlife
- breaks in spraying that exceed the potlife
- overnight shutdown
- before servicing the fluid manifold assembly, hose or gun.

1. Go to Standby mode (remove Mix input).



Trigger the gun to relieve pressure.

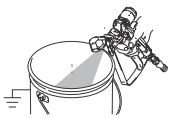
If you are using a high pressure gun, engage the trigger lock. Remove spray tip and clean tip separately.



If using an electrostatic gun shut off the electrostatics before flushing the gun.

2. Set the solvent supply pressure regulator at a pressure high enough to completely purge the system in a reasonable amount of time but low enough to avoid splashing or an injection injury. Generally, a setting of 100 psi (0.7 MPa, 7 bar) is sufficient.
3. If using a gun flush box, place the gun into the box and close the lid. Go to Purge mode. The purge sequence automatically starts.

   If the gun flush box is not used, trigger the gun (manual or automatic) into a grounded metal pail until the purge sequence is complete.

   When done purging, the EasyKey automatically switches to Standby mode.
4. If the system is not completely clean, repeat step 3.

   NOTE: If necessary, adjust purge sequence so only one cycle is required.

Trigger the gun to relieve pressure. Engage trigger lock.

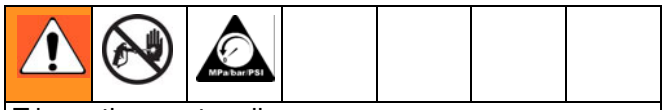
5. If spray tip was removed, reinstall it.
6. Adjust the solvent supply regulator back to its normal operating pressure.

Purging Using Recipe 0

Recipe 0 is typically used in multiple color systems to purge out material lines without loading a new color.

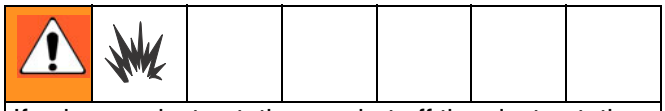
To setup Recipe 0, go to Advanced Setup. Select the Recipe tab and change the Recipe to 0. The Recipe 0 Setup Screen appears. Set the chop times from 0-999 seconds in increments of 1 second.

1. Go to Standby mode (remove Mix input).



Trigger the gun to relieve pressure.

If you are using a high pressure gun, engage the trigger lock. Remove spray tip and clean tip separately.



If using an electrostatic gun shut off the electrostatics before flushing the gun.

2. If using a gun flush box, place the gun into the box and close the lid.

3. Select Recipe 0 and press Enter ↵.

4. If a gun flush box is not used, trigger the gun (manual or automatic) into a grounded metal pail until the purge sequence is complete.

5. The color change LED blinks while Recipe 0 runs and turns solid after purge sequence is complete.

6. If the system is not completely clean, you can repeat Recipe 0 by pressing Enter ↵.

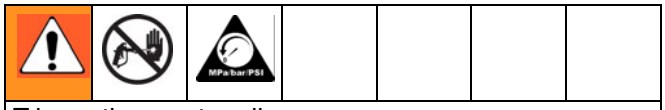
Purging Fluid Supply System

Follow this procedure before:

- the first time material is loaded into equipment*
- servicing
- shutting down equipment for an extended period of time
- putting equipment into storage

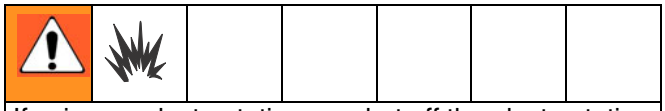
* Some steps are not necessary for initial flushing, as no material has been loaded into the system yet.

1. Go to Standby mode (remove Mix input).



Trigger the gun to relieve pressure.

If you are using a high pressure gun, engage the trigger lock. Remove spray tip and clean tip separately.



If using an electrostatic gun, shut off the electrostatics before flushing the gun.

2. Attach solvent supply lines as follows:

   - **Single color systems:** disconnect the fluid supply at the flow meter inlet, and connect regulated solvent supply lines.

   - **Multiple color systems:** disconnect the fluid supply at the flow meter inlet and connect a regulated solvent supply line.

3. Adjust the solvent fluid supply pressure. Use the lowest possible pressure to avoid splashing.

4. Remove the Fluid Station Control Box cover to access the solenoid valves. See FIG. 75 on page 71.

5. Purge as follows:

   - **Single color systems:** Press the manual override on the Dose Valve A solenoid valve and trigger the gun into a grounded metal pail until clean solvent flows from the gun.

   - **Multiple color systems:** Select Recipe 0 and press Enter ↵. The color change LED blinks while Recipe 0 runs and turns solid after purge sequence is complete.

6. Reinstall the Fluid Station Control Box cover.

7. Shut off the solvent fluid supply.

8. Disconnect the solvent supply lines and reconnect the fluid supply.

9. See page 67 for **Start Up** procedure.

Meter Calibration

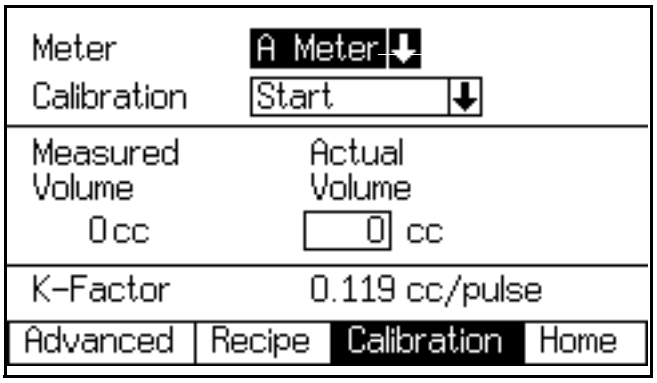
Calibrate the meter:

- The first time the system is operated.
- Whenever new materials are used in the system, especially if the materials have viscosities that differ significantly.
- At least once per month as part of regular maintenance.
- Whenever a flow meter is serviced or replaced.

NOTE:

- K-Factors on the **Calibration Screen** are updated automatically after the calibration procedure is completed.
- K-Factor values on the screen are viewable only. If needed, you can manually edit the K-Factors in **Advanced Setup Screen 4** (see page 37) or **Recipe Setup Screen 5** (page 42).
- All values on this screen are in cc, independent of the units set in **Configure Screen 1**.
- The controller will use the active recipe K-factors for meter calibration. The active recipe must be recipe 1 to recipe 60. Recipes 0 and 61 do not have K-factor values.

1. Before calibrating meter A, prime the system with material. For a color change system, make sure the color valve is open.
2. Shut off all spray or dispense devices connected to the ProControl 1KS.
3. Place the beaker (minimum size - 250 cc) to capture fluid from the gun.
4. On the EasyKey, press the Setup key to access setup screens.
5. Press the Right Arrow key to select the **Calibration Screen**. Press the Enter key to select Dose Valve A. Press the Down Arrow key and select Start from the menu. Start only one at a time.



6. Dispense a minimum of 250 cc into beaker; make sure enough material is dispensed to accurately read the volume with your beaker.
7. The volume that the ProControl 1KS measured displays on the EasyKey.

8. Compare the amounts on the EasyKey to the amount in the beaker.

   NOTE: For maximum accuracy, use a gravimetric (mass) method to determine the actual volume dispensed.

9. If the screen and actual volume are different, enter the actual dispensed volume in cc for A or Solvent Volume field, and press the Enter ↵ key.

   If the value was substantially different, repeat the calibration process.

   NOTE: If the screen and actual volume is the same or if for any reason you want to cancel the calibration procedure, scroll to Abort on the **Calibration Screen** menu and press the Enter ↵ key.

10. After the volume for A or Solvent is entered, the ProControl 1KS controller calculates the new flow meter K-Factor and shows it on the **Calibration Screen**.

    NOTE: K-Factor values on the screen are viewable only. If needed, you can manually edit the K-Factors in **Advanced Setup Screen 4** (page 37) or **Recipe Setup Screen 5** (page 42).

11. Before you begin production, clear the system of solvent and prime it with material.

    a. Go to Mix mode.

    b. Trigger the gun into a grounded metal pail until mixed material flows from the gun nozzle.

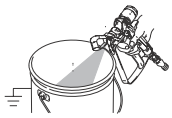
    c. To begin operation, see **Start Up**, page 67.

Color Change

Color Change Procedures

Multiple Color Systems

1. Shut off air to the gun.
2. Place the gun in the gun flush box if used, and close the lid.
3. Go to Standby mode (remove Mix input).
4. Select the new recipe. Begin the color change sequence.
5. If a gun flush box is not used, trigger the gun (manual or automatic) into a grounded metal pail until the color change sequence is complete.

   NOTE: The color change timer does not start until a Gun Trigger input is seen and fluid flow is detected. If no flow is detected within 2 minutes, the color change operation aborts. The system enters Standby mode (remove Mix input) at the previous color.
6. When you are ready to spray, remove the gun from the gun flush box if used, and close its door (manual and semi-automatic systems only).

   NOTE: The gun flush box door must be closed for the atomizing air valve to open.
7. Enter Mix mode to start spraying.

Single Color Systems

1. Follow procedure for **Purging Fluid Supply System**, page 74.
2. Load the new color. See **Start Up**, page 67.
3. Enter Mix mode to start spraying.

Color Change Sequences

FIG. 78 through FIG. 95 illustrate various color change sequences. See Table 12 to determine which figure to reference, based on the recipe change and system configuration. The time sequences are detailed in the following paragraphs.

NOTE: See **Setup Mode** on page 25 to select purge sources and set desired purge, chop, and fill times.

NOTES:

- The system uses old recipe data for the purge cycle. However, it opens the new color valve based on the new recipe data.
- The system uses the new recipe data for the fill cycle.
- For the one gun flush box (GFB) option, the spray gun must be inserted in the GFB during the entire color change cycle (purge and fill). The GFB trigger output will be on during the recipe change cycle.
- For the two gun flush box (GFB) option, both spray guns must be inserted in the GFBs during the entire color change cycle (purge and fill). The system will turn each GFB trigger output on and off based on the preset time for each gun.
- For Special Outputs options, the system will turn each output on and off based on the preset times. Each Special Output has two different start times and durations.
- For systems without dump valves, the First Purge begins after the Color Change steps are completed.
- When going from Recipe X to Recipe 0, only the purge cycle data from Recipe 0 is used.
- When going from Recipe 0 to Recipe X, only the fill cycle data from Recipe X is used.

Color Purge/Dump

Step P0-P1

- This sequence flushes out the color with solvent, from the color valve to the Dump A valve.
- The color change solvent valve and the Dump A valve open during the Purge Time.
- The color change solvent valve closes when the Purge Time expires.

Color Fill

Step P1-P2

- This sequence fills the line with the new color all the way to the Dump A valve.
- The new color valve and the Dump A valve open during the Fill Time.
- The new color valve and the Dump A valve close when the Fill Time expires.

First Purge

Step M0-M1

Select the First Purge Source (air, solvent, or 3rd valve) and First Purge Time. For most applications, air is selected.

The system purges the old material from the dose valves to the gun, using only the selected purge media (usually air). The selected purge valve opens during the First Purge Time and closes when the time expires.

Chop Cycle

Step M1-M2

Select the Chop Type (air/solvent or air/3rd valve) and Chop Times.

The air purge valve opens only during the air chop cycle, and the solvent (or 3rd valve) opens only during the solvent chop cycle. The number of chop cycles is determined by dividing the Total Chop Time by the sum of the Air and Solvent Chop Times.

Final Purge

Step M2-M3

Select the Final Purge Source (air, solvent, or 3rd valve) and Final Purge Time. For most applications, solvent is selected.

The system fills the line with solvent from the dose valves to the gun, using only the selected purge media (usually solvent). The selected purge valve opens during the Final Purge Time and closes when the time expires.

Fill

Step M3-M4

This sequence fills the line from the dose valves to the gun, and is also referred to as the mixed material fill. The system begins dispensing component A until the Fill Time expires.

Purge Active

Step M0-M3

The system turns on the Purge/Recipe Change Purge Active output during steps M0-M3.

Fill Active

Step M3-M4

The system turns on the Recipe Change Fill Active output during step M3-M4.

Table 12: Color Change Chart Reference

Starting Recipe	Ending Recipe	Color Change	Catalyst Change	Dump Valves	3rd Purge Valve	Number of Gun Flush Boxes	Refer to Fig.
X	X	Yes	Yes	Yes	Yes	0	FIG. 79
X	X	Yes	Yes	Yes	No	0	FIG. 78
X	X	Yes	No	No	No	0	FIG. 81
X	X	Yes	No	Yes	No	0, 1, or 2	FIG. 80
X	X	No	Yes	Yes	No	0, 1, or 2	FIG. 82
X	X	No	No	No	No	0, 1, or 2	FIG. 92
X	X	Yes	Yes	Yes	No	1	FIG. 84
X	X	Yes	No	No	No	1	FIG. 86
X	X	Yes	Yes	Yes	No	2	FIG. 83
X	X	Yes	No	No	No	2	FIG. 85
X	0	Yes	Yes	Yes	No	0, 1, or 2	FIG. 87*
X	0	Yes	No	Yes	No	0, 1, or 2	FIG. 87*
X	0	Yes	No	No	No	0, 1, or 2	FIG. 89**
X	0	No	Yes	Yes	No	0, 1, or 2	FIG. 87*
X	0	No	No	No	No	0, 1, or 2	FIG. 89**
0 or 61	X	Yes	Yes	Yes	No	0, 1, or 2	FIG. 88*
0 or 61	X	Yes	No	Yes	No	0, 1, or 2	FIG. 88*
0 or 61	X	Yes	No	No	No	0, 1, or 2	FIG. 90**
0 or 61	X	No	Yes	Yes	No	0, 1, or 2	FIG. 88*
0 or 61	X	No	No	No	No	0, 1, or 2	FIG. 90**
0	0	Yes	Yes	Yes	No	0, 1, or 2	FIG. 87*
0	0	Yes	No	Yes	No	0, 1, or 2	FIG. 87*
0	0	Yes	No	No	No	0, 1, or 2	FIG. 89**
0	0	No	Yes	Yes	No	0, 1, or 2	FIG. 87*
0	0	No	No	No	No	0, 1, or 2	FIG. 89**
61	0	Yes or No	Yes or No	Yes or No	No	0, 1, or 2	FIG. 87*
0	X	Yes	Yes	Yes	Yes	0, 1, or 2	FIG. 94
0	X	Yes	No	Yes	Yes	0, 1, or 2	FIG. 94
0	X	Yes	No	No	Yes	0, 1, or 2	FIG. 95
0	X	No	Yes	Yes	Yes	0, 1, or 2	FIG. 94
0	X	No	No	No	Yes	0, 1, or 2	FIG. 95

NOTES:

* *FIG. 87 and FIG. 88 show both color and catalyst change. If the color or catalyst is not changing, disregard that portion of the chart.*

** *FIG. 89 and FIG. 90 show color change. If the color is not changing, disregard that portion of the chart.*

FIG. 91 (page 87) shows a recipe change with Special Outputs.

FIG. 93 (page 88) shows an External Color Change.

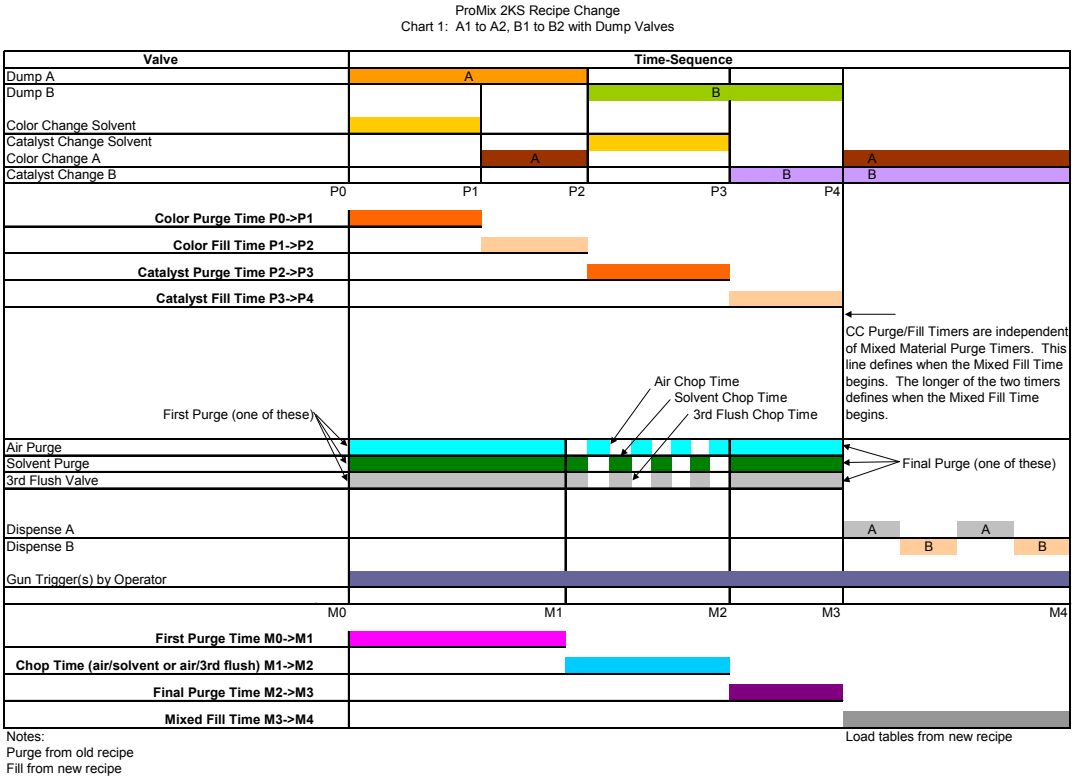


FIG. 78: Color Change Chart 1

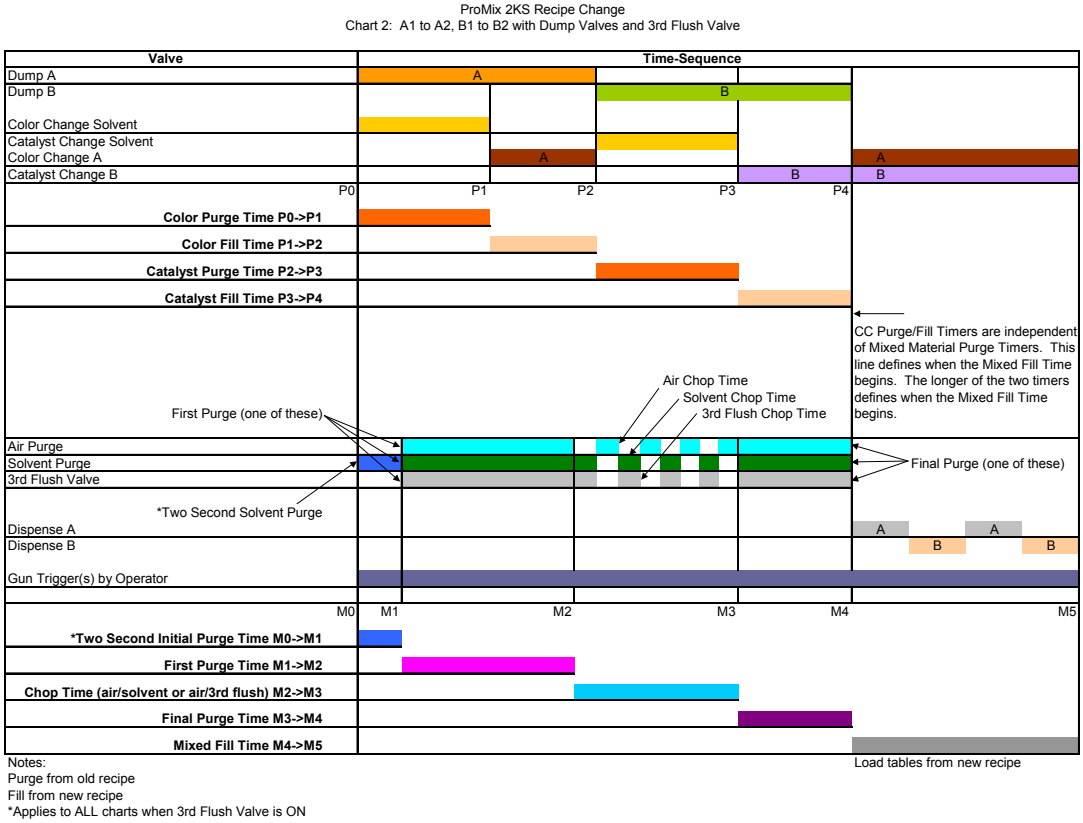


FIG. 79: Color Change Chart 2

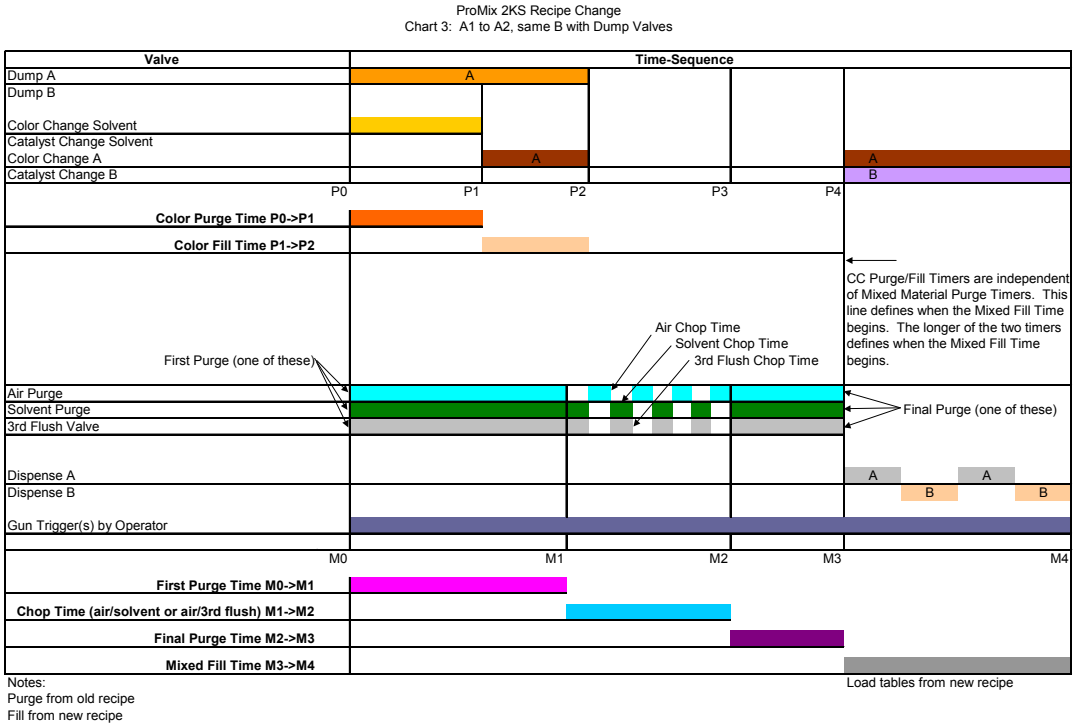


FIG. 80: Color Change Chart 3

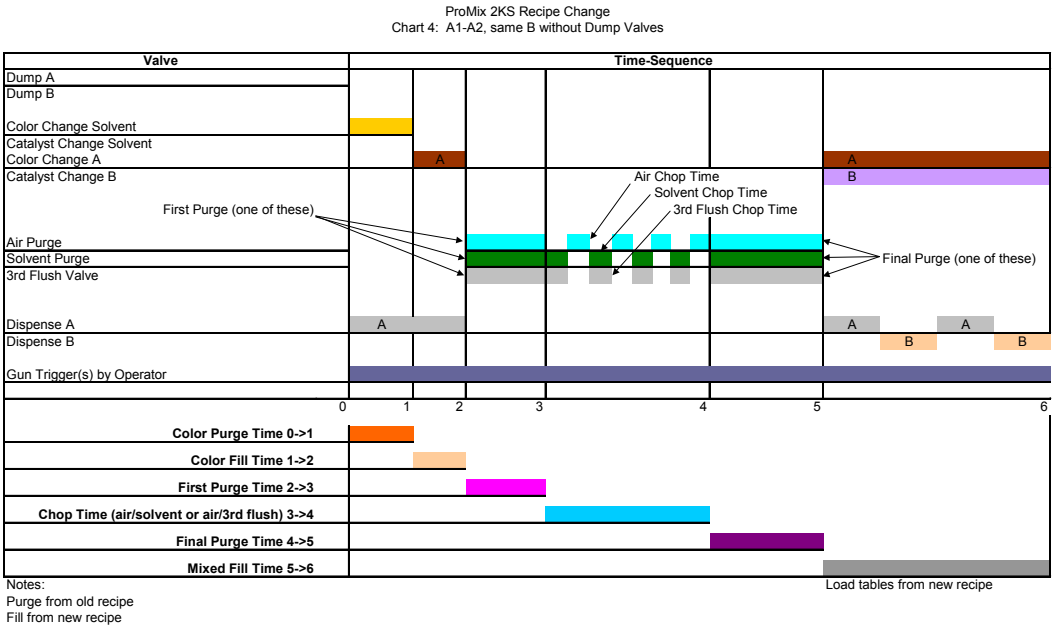


FIG. 81: Color Change Chart 4

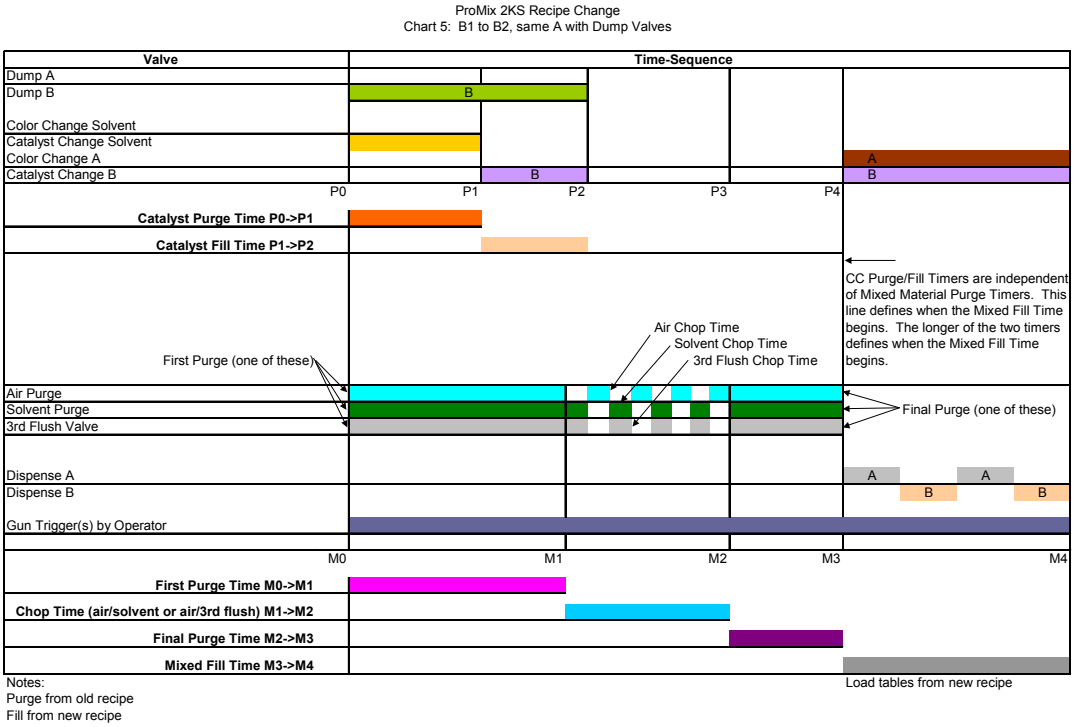


FIG. 82: Color Change Chart 5

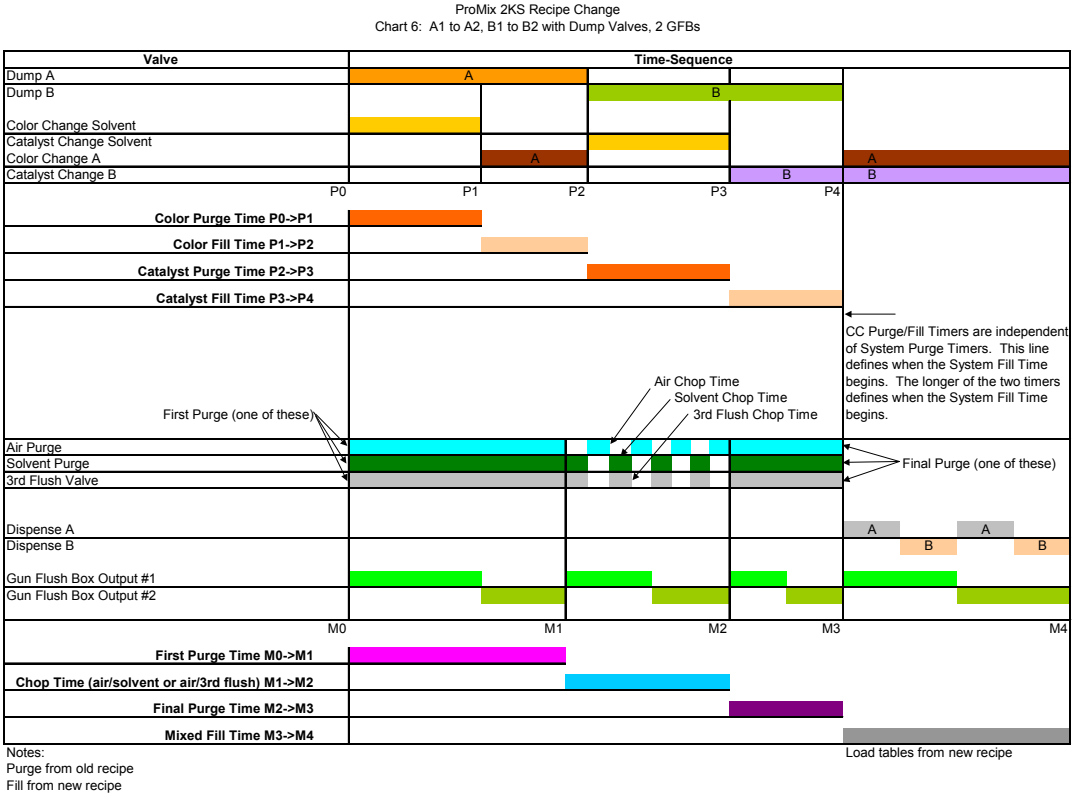


FIG. 83: Color Change Chart 6

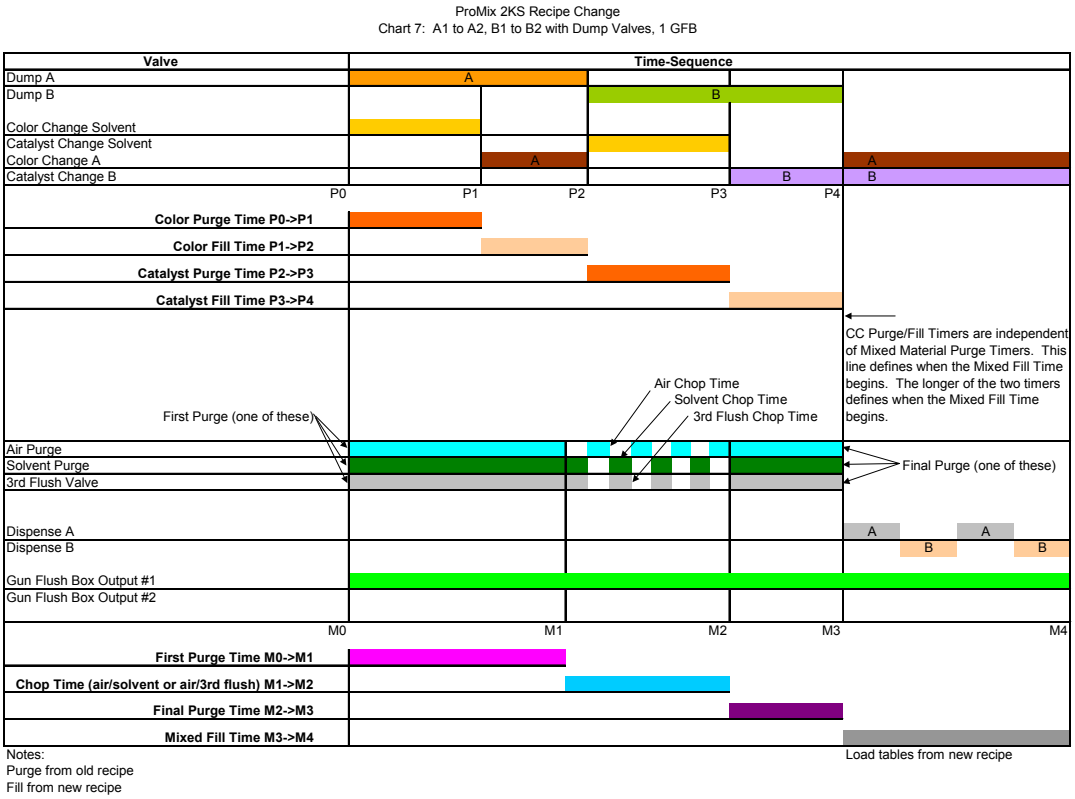


FIG. 84: Color Change Chart 7

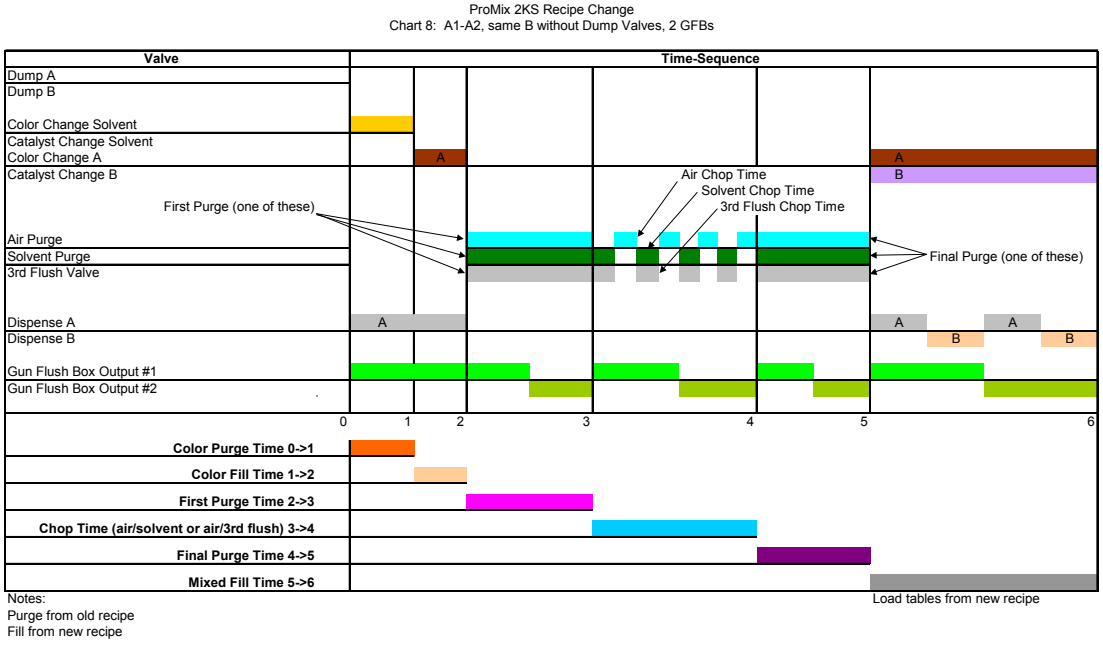


FIG. 85: Color Change Chart 8

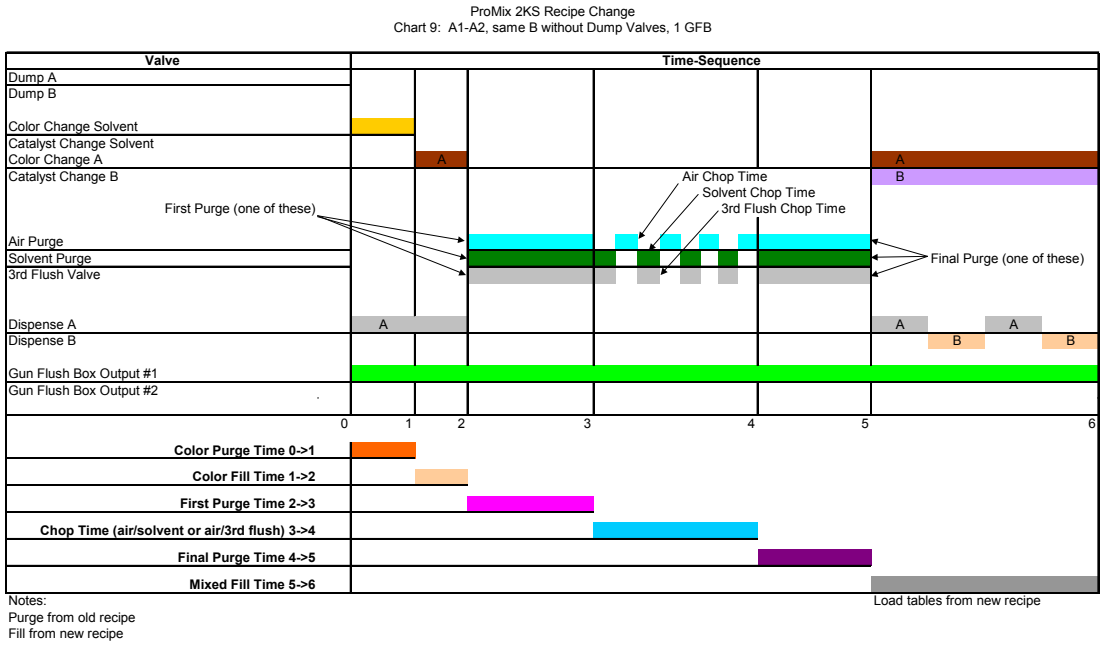


FIG. 86: Color Change Chart 9

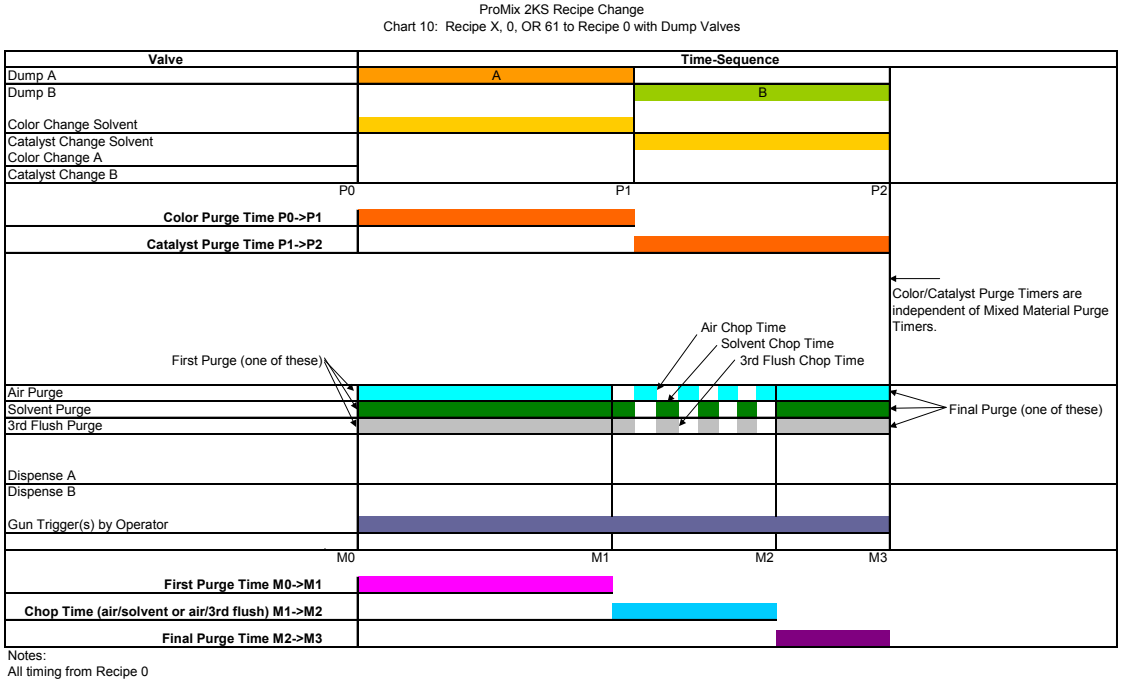


FIG. 87: Color Change Chart 10

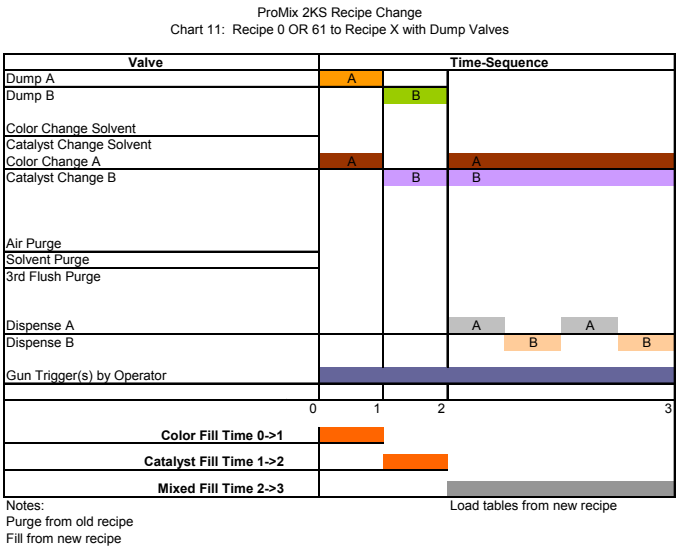


FIG. 88: Color Change Chart 11

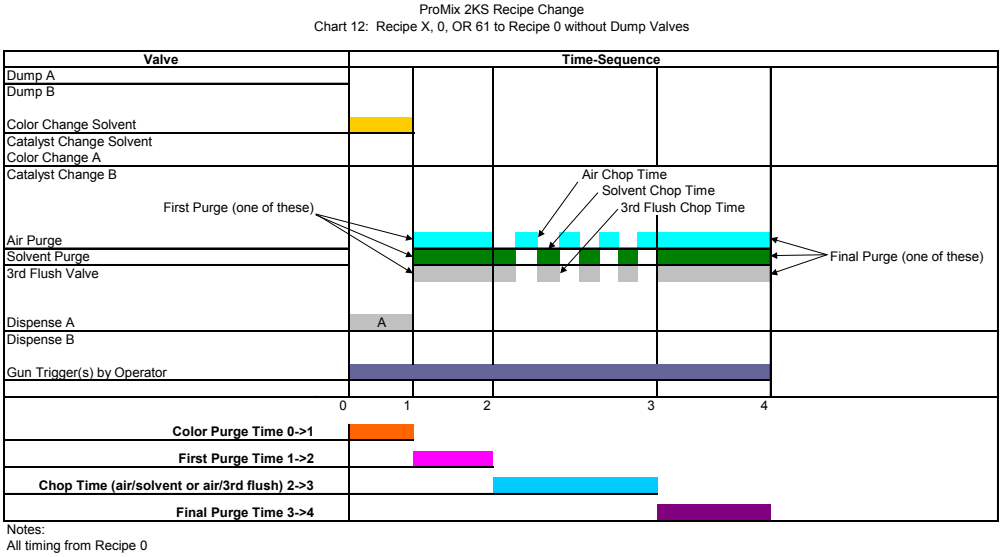


FIG. 89: Color Change Chart 12

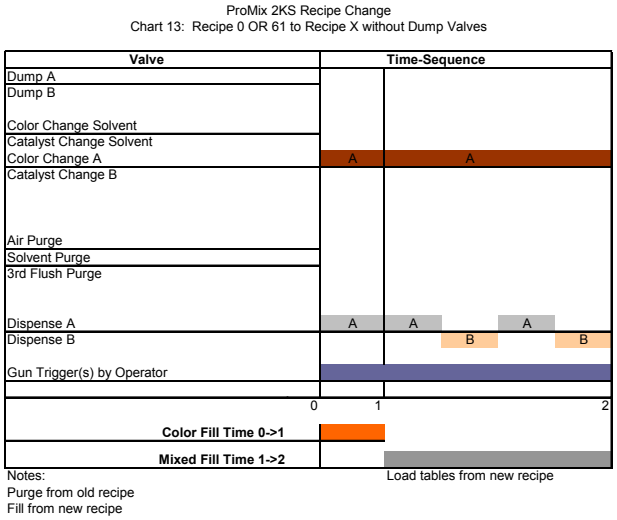


FIG. 90: Color Change Chart 13

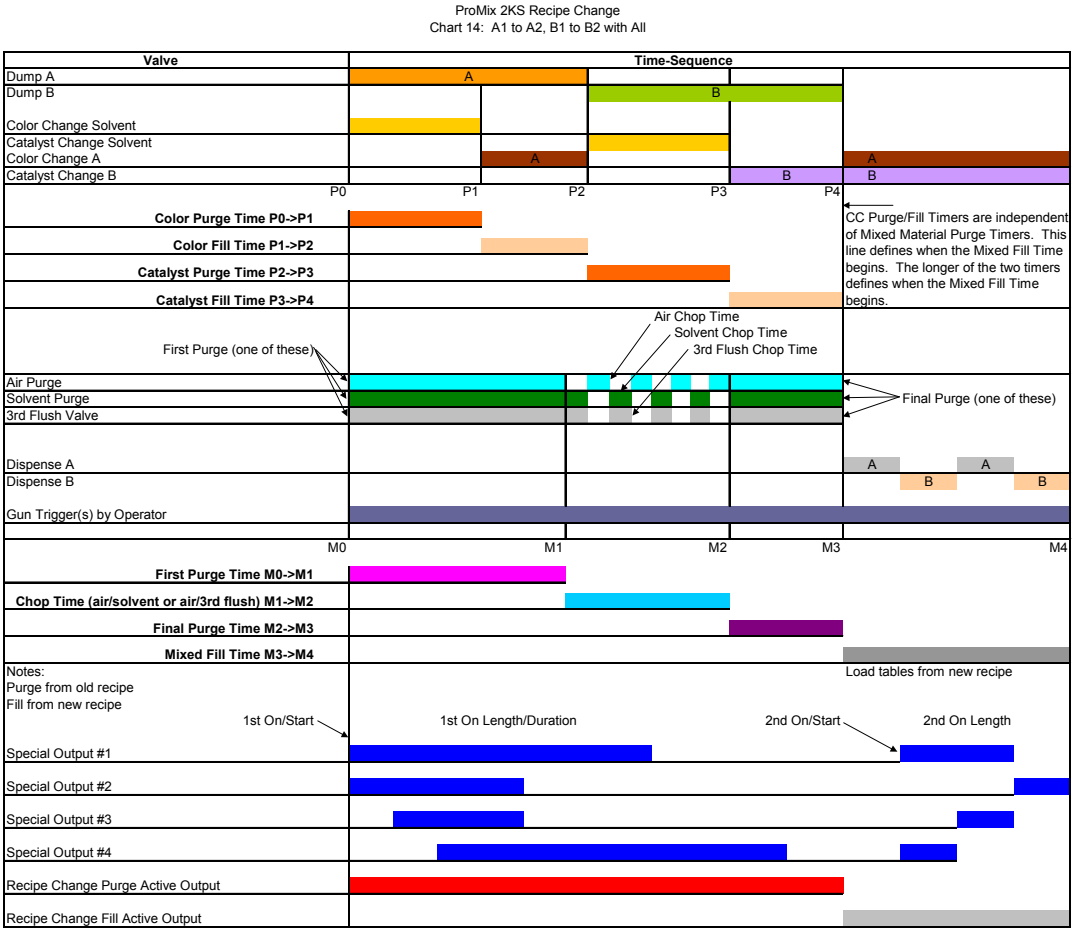


FIG. 91: Color Change Chart 14

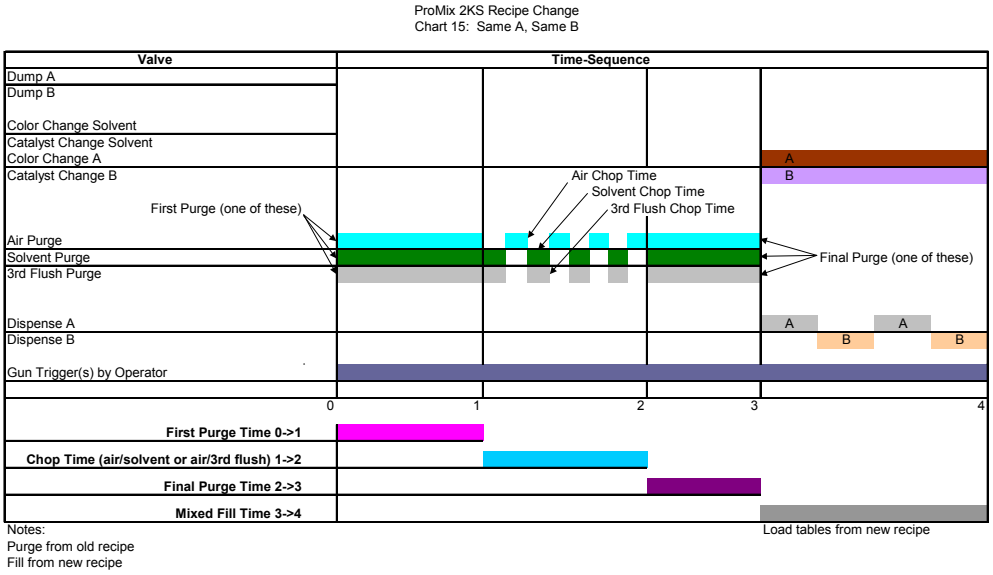


FIG. 92: Color Change Chart 15

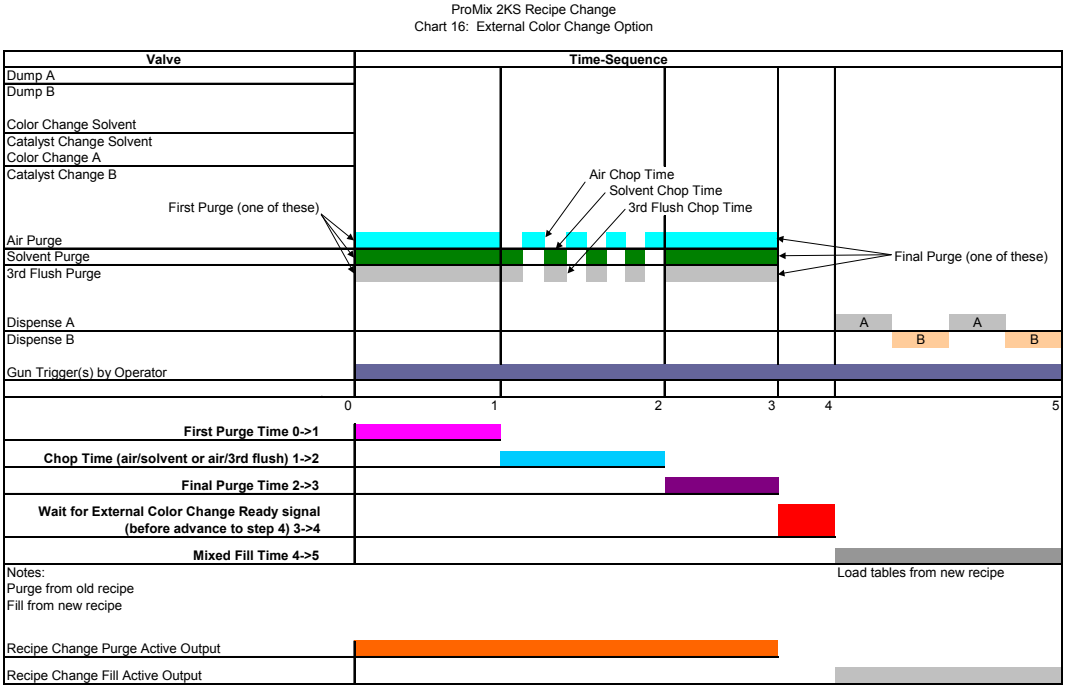


FIG. 93: Color Change Chart 16

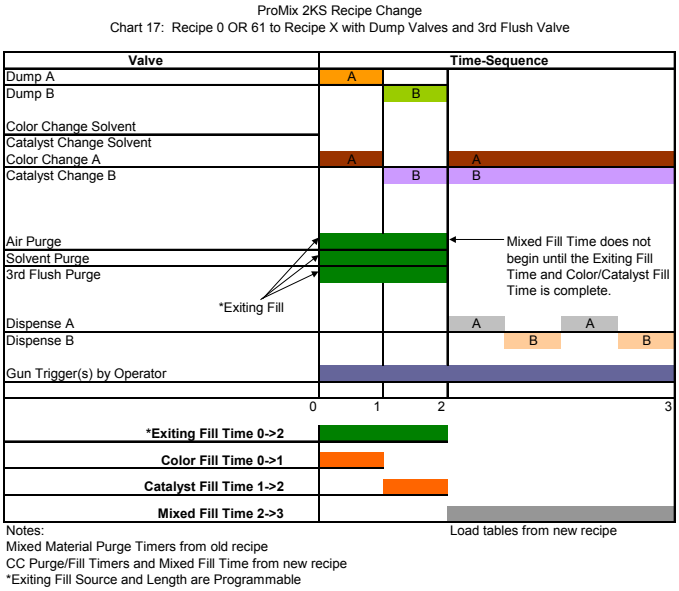


FIG. 94: Color Change Chart 17

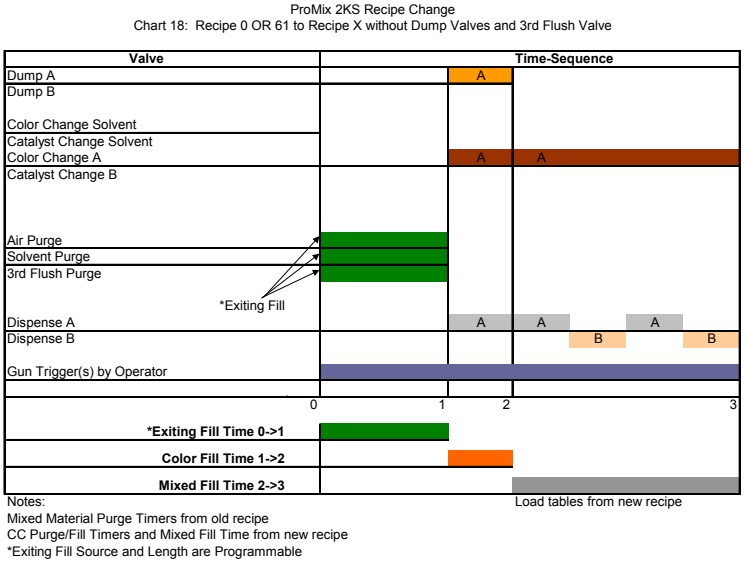


FIG. 95: Color Change Chart 18

Alarms and Warnings

NOTE: Do not use the fluid in the line that was dispensed off ratio as it may not cure properly.

System Alarms

System alarms alert you of a problem and help prevent off-ratio spraying. If an alarm occurs, operation stops and the following occurs:

- Alarm sounds.
- Status bar on the EasyKey shows the alarm E-Code with a description (see Table 13).

System Warnings

Table 13 lists the System Warning Codes. Warnings do not stop operation or sound an alarm. They are saved in the date/time stamped log, which can be viewed on a PC, using the Web Interface (see manual 313386).

To Reset Alarm and Restart

NOTE: When an alarm occurs be sure to determine the E-Code before resetting it. See Table 13. If you forget which E-Code occurred, use the **Alarms Screen** (page 24) to view the last 10 alarms, with date and time stamps.

To reset alarms, see Table 14. Many alarms can be cleared by simply pressing the Alarm Reset key.

Table 13: System Alarm/Warning Codes

Code	Description	Details
E-1	Communication Error Alarm	Page 91
E-2	Potlife Alarm	Page 91
E-3	Ratio High Alarm	Page 92
E-4	Ratio Low Alarm	Page 93
E-5	Overdose A/B Dose Too Short Alarm	Page 94
E-6	Overdose B/A Dose Too Short Alarm	Page 94
E-7	Dose Time A Alarm	Page 95
E-8	Dose Time B Alarm	Page 95
E-9	Mix in Setup Alarm	Page 96
E-10	Remote Stop Alarm	Page 96
E-11	Purge Volume Alarm	Page 96
E-12	CAN Network Communication Error Alarm	Page 96
E-13	High Flow Alarm	Page 96
E-14	Low Flow Alarm	Page 96
E-15	System Idle Warning	Page 97
E-16	Setup Change Warning	Page 97
E-17	Power On Warning	Page 97
E-18	Defaults Loaded Warning	Page 97
E-19	I/O Alarm	Page 98
E-20	Purge Initiate Alarm	Page 99
E-21	Material Fill Alarm	Page 99
E-22	Tank A Low Alarm	Page 99
E-23	Tank B Low Alarm	Page 99
E-24	Tank S Low Alarm	Page 99
E-25	Auto Dump Complete Alarm	Page 100
E-26	Color/Catalyst Purge Alarm	Page 100
E-27	Color/Catalyst Fill Alarm	Page 100

Alarm Troubleshooting

Table 14. Alarm Troubleshooting

E-1: COMM_ERROR	
Cause	**Solution**
No power to the EasyKey.	Connect power to EasyKey.
No power to Fluid Station Control Box. The intrinsically safe power cable between the EasyKey and Fluid Station Control Box is not connected.	Verify that the cable is correctly connected. See Installation manual.
No power to Fluid Station Control Box. The fluid control board fuse is blown.	Verify condition of fuse and replace if necessary. See Repair-Parts manual.
The fiber optic cable between the EasyKey and Fluid Station Control Box is not connected.	Verify that the cable is correctly connected. See Installation manual.
The fiber optic cable is cut or bent.	Verify that the cable has not been cut or bent at a radius smaller than 1.6 in. (40 mm).
Dirty fiber optic cable ends.	Disconnect fiber optic cable ends and clean with a lint-free cloth.
A communication cable or connector failed.	Replace cable.
E-2: POTLIFE_ALARM	
Cause	**Solution**
The potlife time has been exceeded for the mixed material. ***NOTICE*** To prevent mixed material from curing in the equipment, do not shut off power. Follow one of the solutions at right.	Press the Alarm Reset key to stop the audible alarm. Purge the system with solvent, fresh mixed material, or a new color: • **Solvent Purge -** See **Purging Mixed Material** on page 73. The system purges until the preset purge time is complete. • **New Mixed Material Purge -** Go to Mix mode and spray the required volume to restart the timer. • **Color Change -** Perform a color change, see page 78.

Table 14. Alarm Troubleshooting

E-3: RATIO_HIGH_ALARM	
The mix ratio is higher than the set tolerance on the previous dose cycle.	
Cause	**Solution**
There is too little restriction in the system.	• Check that the system is fully loaded with material. • Check that the supply pump's cycle rate is set properly. • Check that the spray tip/nozzle is properly sized for the flow and application, and that it is not worn. • Check that the fluid regulator is set properly.
If the alarm occurs during start up, after purging, the flow rate was probably too high.	Restrict gun needle travel to slow down the initial fluid delivery rate until fluid hoses are loaded with material.
If the alarm occurred after you were spraying for some time, the pressures from the fluid supply could be too high.	*A*djust fluid supply regulator pressure. Verify that component A dose valve is operating properly.
Slow actuation of the component A valve. This can be caused by:	Manually operate the Dispense A solenoid valves as instructed in the ProControl 1KS Repair-Parts manual to check operation.
• Air pressure to the valve actuator is too low.	• Increase air pressure. Air pressure must be 75-120 psi (0.52-0.84 MPa, 5.2-8.4 bar); 120 psi is recommended.
• Something is restricting the solenoid or tubing and interrupting valve actuation air.	• There may be dirt or moisture in the air supply. Filter appropriately.
• A dose valve is turned in too far.	• Refer to **Table 10: Mix Manifold Valve Settings**, page 67, for adjustment guidelines.
• Fluid pressure is high and air pressure is low.	• Adjust air and fluid pressure. See recommended air pressure above.

Table 14. Alarm Troubleshooting

E-4: RATIO_LOW_ALARM	
The mix ratio is lower than the set tolerance on the previous dose cycle.	
Cause	**Solution**
There is too much restriction in the system.	• Check that the system is fully loaded with material. • Check that the supply pump's cycle rate is set properly. • Check that the spray tip/nozzle is properly sized for the flow and application, and that it is not clogged. • Check that the fluid regulator is set properly.
If the alarm occurs during start up, after purging, the flow rate was probably too high.	Restrict gun needle travel to slow down the initial fluid delivery rate until fluid hoses are loaded with material.
If the alarm occurred after you were spraying for some time, the pressure from the fluid supply could be too low.	*A*djust fluid supply regulator pressure. Verify that component A dose valve is operating properly.
Slow actuation of the component A valve. This can be caused by:	Manually operate the Dispense A solenoid valves as instructed in the ProControl 1KS Repair-Parts manual to check operation.
• Air pressure to the valve actuator is too low.	• Increase air pressure. Air pressure must be 75-120 psi (0.52-0.84 MPa, 5.2-8.4 bar); 120 psi is recommended.
• Something is restricting the solenoid or tubing and interrupting valve actuation air.	• There may be dirt or moisture in the air supply. Filter appropriately.
• A dose valve is turned in too far.	• Refer to **Table 10: Mix Manifold Valve Settings**, page 67, for adjustment guidelines.
• Fluid pressure is high and air pressure is low.	• Adjust air and fluid pressure. See recommended air pressure above.

Table 14. Alarm Troubleshooting

E-5: OVERDOSE_A/B_DOSE_TOO_SHORT_ALARM and E-6: OVERDOSE_B/A_DOSE_TOO_SHORT_ALARM	
E-5: the A dose overshoots and, when combined with B, is too large for the mix chamber capacity. E-6: the B dose overshoots and forces an A side dose that, when combined with B, is too large for the mix chamber capacity.	
Cause	**Solution**
Valve seal or needle/seat are leaking. Check **FIG. 16 Totals Screen** on page 23. I	Repair the valve (see valve manual 312782).
Sampling valve is leaking.	Tighten or replace valve.
Flow meter fluctuations caused by pressure pulsations.	Check for pressure pulsations: 1. Close all the manifold valves. 2. Turn on the circulating pumps and all the booth equipment (such as fans and conveyors). 3. Check if the ProControl 1KS is reading any fluid flow. 4. If the ProControl 1KS shows there is fluid flow and there are no leaks from the gun or any other seals or fittings, the flow meters are probably being affected by pressure pulsations. 5. Close the fluid shutoff valve between the fluid supply system and the flow meter. The flow indication should stop. 6. If necessary, install pressure regulators or a surge tank on the fluid inlets to the ProControl 1KS to reduce the fluid supply pressure. Contact your Graco distributor for information.
Slow actuation of component A valve.	See **E-3: RATIO_HIGH_ALARM** and **E-4: RATIO_LOW_ALARM**, pages 92-93.
Running a high mix ratio and a high flow rate.	It may be necessary to restrict the flow rate through the component B dose valve by adjusting its hex nut (E). See page 66.

Table 14. Alarm Troubleshooting

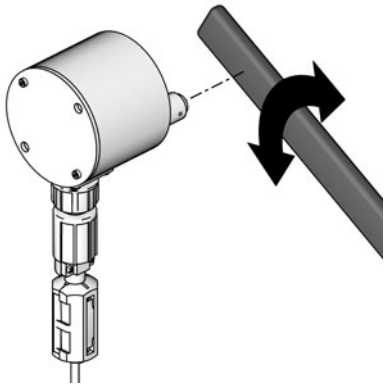
E-7: DOSE_TIME_A_ALARM and E-8: DOSE_TIME_B_ALARM	
E-7: gun trigger input is active (AFS or Integration) and no A meter pulses are detected during the dose time selected. E-8: gun trigger input is active (AFS or Integration) and no B meter pulses are detected during the dose time selected.	
Cause	**Solution**
System is in Mix mode and gun is only partially triggered, allowing air but no fluid to pass through gun.	Fully trigger the gun.
Fluid flow rate is too low.	Increase flow rate.
Dose time setting is too short for the current flow rate.	Increase the dose time setting.
Flow meter or cable failed or flow meter clogged.	To check meter sensor operation, remove meter cap to expose sensor. Pass a ferrous metal tool in front of the sensor.  TI12792a If there is a meter or cable failure, you will see a large difference between the amount of fluid dispensed and the flow meter volume displayed by the EasyKey. Clean or repair meter as necessary. Also see meter manual 308778. Follow **Meter Calibration** procedure, page 76.
Slow actuation of component A valve.	See **E-3: RATIO_HIGH_ALARM** and **E-4: RATIO_LOW_ALARM**, pages 92-93.
The supply pump is not turned on.	Turn on the supply pump.
System is in Mix mode with 0 volume entered for Min Material Fill Volume (see **Option Screen 1**, page 32), and Fuse F1 is blown.	Verify condition of fuse and replace if necessary. See Repair-Parts manual.

Table 14. Alarm Troubleshooting

E-9: MIX_IN_SETUP_ALARM	
Cause	**Solution**
Attempt to operate system while in Setup mode.	System must be in Standby to change current recipe, and cannot be operated.
E-10: REMOTE_STOP_ALARM	
Cause	**Solution**
Automation has requested that the system abort all operations.	Abort operations. Troubleshoot automation system.
E-11: PURGE_VOLUME_ALARM	
Cause	**Solution**
ProControl 1KS solvent flow switch is not activated while purging.	Verify that the gun is not shut off and that the solvent flow switch is activated while purge is taking place.
Minimum flush volume is set too high.	Increase solvent supply or decrease minimum volume setting.
No meter pulses during Color/Catalyst Dump.	Color change solvent supply not set up or functional. Check Color Change setup.
E-12: CAN_COMM_ERROR_ALARM	
Cause	**Solution**
Communication between the Color Change Module and the Fluid Station Control Box is interrupted.	Verify that the cable is correctly connected.
Communication between the Color Change Module and the Fluid Station Control Box is interrupted. The fluid control board fuse is blown.	Verify condition of fuse and replace if necessary. See Repair-Parts manual.
E-13: HIGH_FLOW_ALARM or E-14: LOW_FLOW_ALARM (may also be set as Warnings)	
Cause	**Solution**
Fluid system is producing too much or too little flow.	Troubleshoot fluid system for restrictions, leaks, exhausted fluid supply, incorrect settings, etc. Increase or decrease flow rate, as required.

Table 14. Alarm Troubleshooting

E-15: SYSTEM_IDLE_WARNING	
Cause	**Solution**
Mix input is high, but the gun has not been triggered for 2 minutes.	If not painting, clear alarm and resume operation. If painting, shut down and inspect fluid meter.
E-16: SETUP_CHANGE_WARNING	
Cause	**Solution**
The system setup parameters have been changed.	No action required. See Event Log available through advanced web interface.
E-17: POWER_ON_WARNING	
Cause	**Solution**
The power to the system has been cycled.	No action required. See Event Log available through advanced web interface.
E-18: DEFAULTS_LOADED_WARNING	
Cause	**Solution**
The factory defaults have been installed on the system.	No action required. See Event Log available through advanced web interface.

Table 14. Alarm Troubleshooting

E-19: I/O_ALARM	
Cause	**Solution**
The Mix and Purge digital inputs are on at the same time.	Ensure that only one input is on at a time. At least 1 sec delay is required when switching from Mix to Purge or vice versa.
NOTE: The I/O alarm incorporates several sub-alarms relating to internal data issues, as detailed below. These alarms may not apply to all software versions.	
Fluid Plate Reboot (FP Reboot): Occurs if the system detects a fluid plate control board reboot or power cycle not triggered from the EasyKey. The system reverts to Recipe 61, and mixed material may be in the lines.	Flush the system or perform a color change. If possible, identify the origin of the reboot or power cycle.
Autokey Lost: Occurs if the Autokey is lost or changed after having been detected. (A short term loss of the Autokey will not be registered.) Some system functions may become unavailable. For example, an automatic system will not respond to PLC or robot control.	Reinstall the Autokey, or verify that the Autokey is set properly.
Illegal Source: Occurs if a recipe outside of the range 1-60 is detected as the source data for global recipe data copies. This is possible if an invalid configuration file is sent to the EasyKey.	Verify that the source data is from a valid recipe (1-60).
2K/3K Error: Occurs if the recipe data is incompatible with the current Autokey setting (2K or 3K). This is possible if the Autokey is changed or an invalid configuration file is sent to the EasyKey.	Verify that the Autokey is set properly or that the configuration file is valid.
Init Error: Occurs if the recipe data codes specifying the type of machine they were made on are not what is expected. For example, a 3KS machine receives a configuration file originally made on a 2KS machine.	Verify that the configuration file is valid.
Config Error: Occurs if a configuration file sent to the EasyKey specifies a different hardware setup than what exists. For example, the configuration file specifies 2 color change boards but only 1 is present.	Verify that the configuration file specifications and the hardware conform.
Range Error: Occurs if a valve used in a recipe is not present in the current hardware setup. For example, a recipe calls for valve 30 but the system has only 12 valves.	Verify that the recipe specifications and the hardware conform.
Level Control (LC) Error: Occurs if level control data is received by the EasyKey, and the current Autokey setting (2K or 3K) has changed since the level control data was originally initialized.	Verify that the Autokey is set properly.
Level Control (LC) Range Error: Occurs if level control data includes a valve range exceeding the capability of the machine.	Set level control data correctly.
Modbus (MB) Overflow: Occurs if the Modbus connection to a PLC experiences data overflow.	Verify the Modbus protocol to the EasyKey.

Table 14. Alarm Troubleshooting

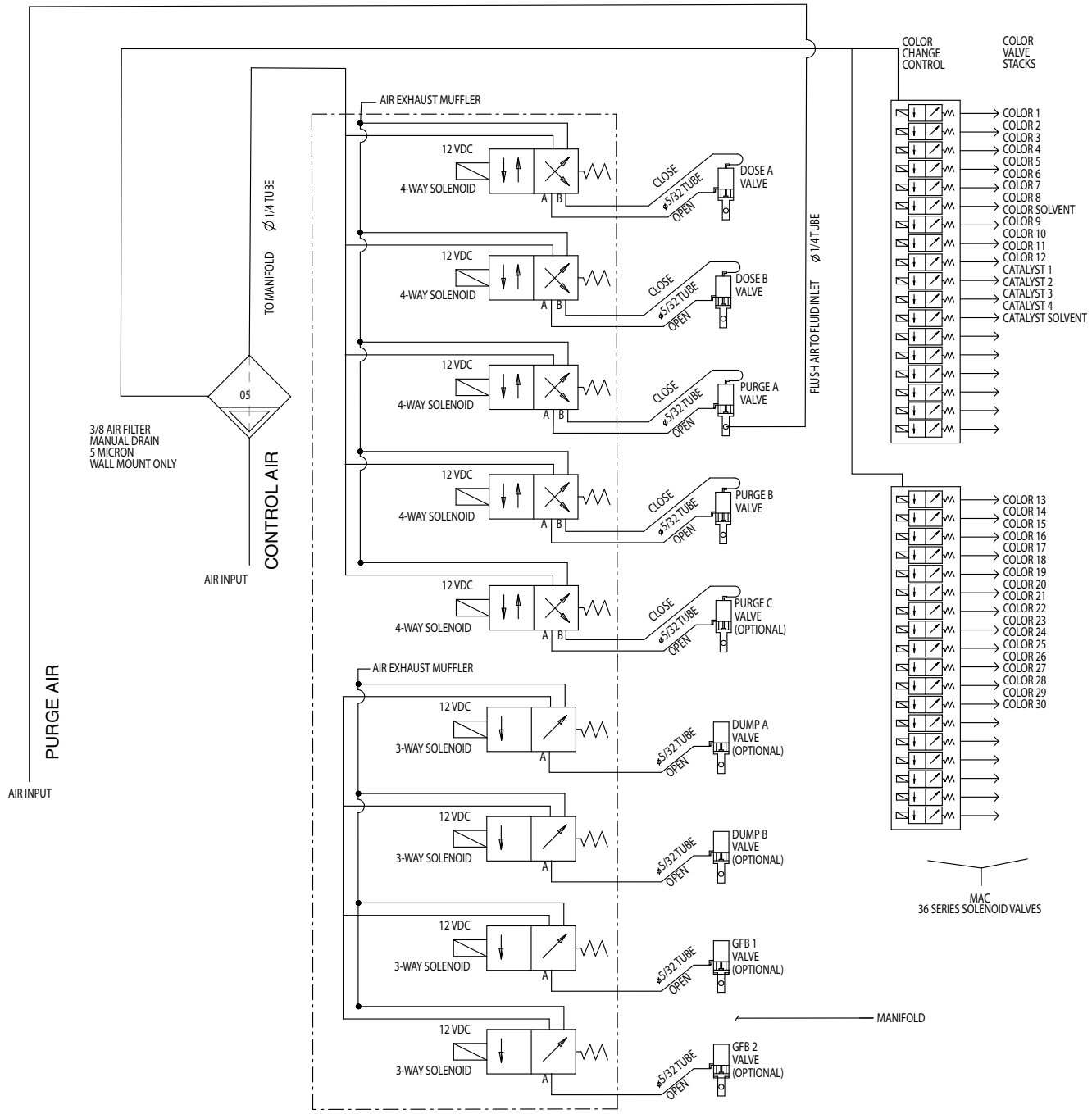
E-20: PURGE_INITIATE_ALARM	
Cause	**Solution**
System detects atomizing air to the gun when purge is selected.	Shut off gun air.
For systems with a gun flush box, gun is not in the box when purge is selected.	Place gun in gun flush box. Verify that gun flush box is operating properly.
For systems with auto dump on, gun is not in the box when auto dump is initiated.	Place gun in gun flush box. Verify that gun flush box is operating properly.
For systems with a gun flush box, Fuse F2 is blown.	Verify condition of fuse and replace if necessary. See Repair-Parts manual.
E-21: MATERIAL_FILL_ALARM	
Cause	**Solution**
For systems with minimum mixed material fill volume entered, the system detects that fill volume is not achieved during mixed material fill time.	Check for restrictions or leaks in the fluid supply system. Check if the fill volume is properly configured: • Adjust fill volume. • Adjust fill time.
For systems without color change and with minimum mixed material fill volume entered, Fuse F1 is blown.	Verify condition of fuse and replace if necessary. See Repair-Parts manual.
E-22: TANK_A_LOW_ALARM, E-23: TANK_B_LOW_ALARM, or E-24: TANK_S_LOW_ALARM	
Cause	**Solution**
The tank volume reaches the low-level threshold.	The EasyKey screen will display the alarm and prompt the user to do one of the following: • Refill tank volume to clear the alarm. • Resume mixing by selecting “Spray 25% of remaining volume.” If this selection is chosen, a second alarm will occur after 25% of the remaining volume is mixed. Refill tank volume to clear the alarm.

Table 14. Alarm Troubleshooting

E-25: AUTO_DUMP_COMPLETE_ALARM	
Cause	**Solution**
A potlife alarm is active for more than 2 minutes, the gun flush box is enabled and gun is in the gun flush box, and an auto dump flush sequence is complete.	Be sure to spray all mixed material before potlife expires.
E-26: COLOR/CATALYST_PURGE_ALARM	
Cause	**Solution**
System detects no meter pulses, or a disruption in meter pulses lasting longer than 1 second throughout the Color purge time duration.	Check that meter cable is connected. Clean or repair meter.
E-27: COLOR/CATALYST_FILL_ALARM	
Cause	**Solution**
System detects no meter pulses, or system must detect at least 10cc of material from each side throughout the Color fill time duration.	Check that meter cable is connected. Clean or repair meter.
Gun, dump valve, or correct color/catalyst valve not open.	Open the valve.
Exhausted fluid supply.	Check fluid level and refill if necessary.
Fuse F1, F2, or both are blown.	Verify condition of fuses and replace if necessary. See Repair-Parts manual.

Schematic Diagrams

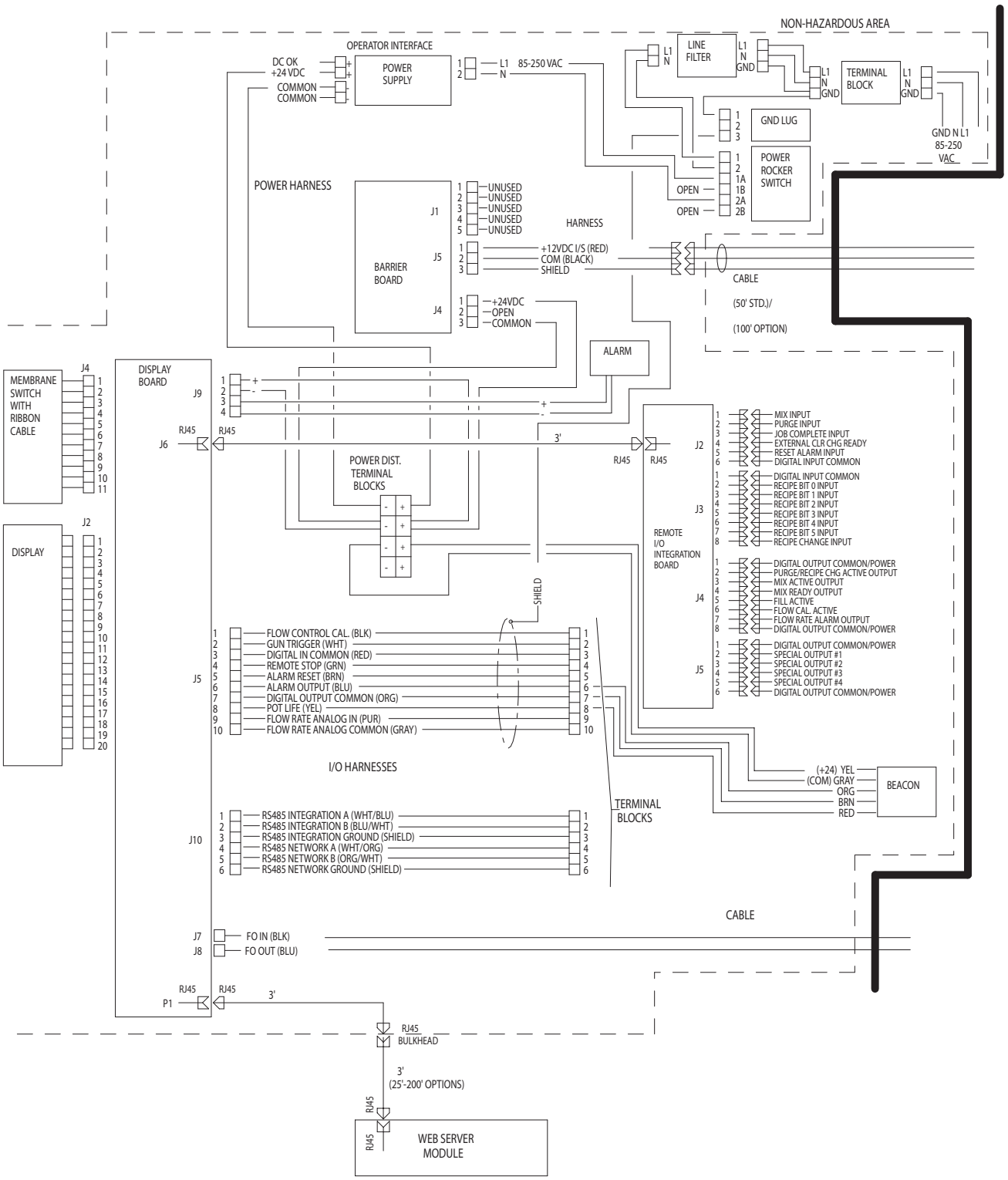
System Pneumatic Schematic



System Electrical Schematic

NOTE: The electrical schematic illustrates all possible wiring expansions in a ProControl 1KS system. Some components shown are not included with all systems.

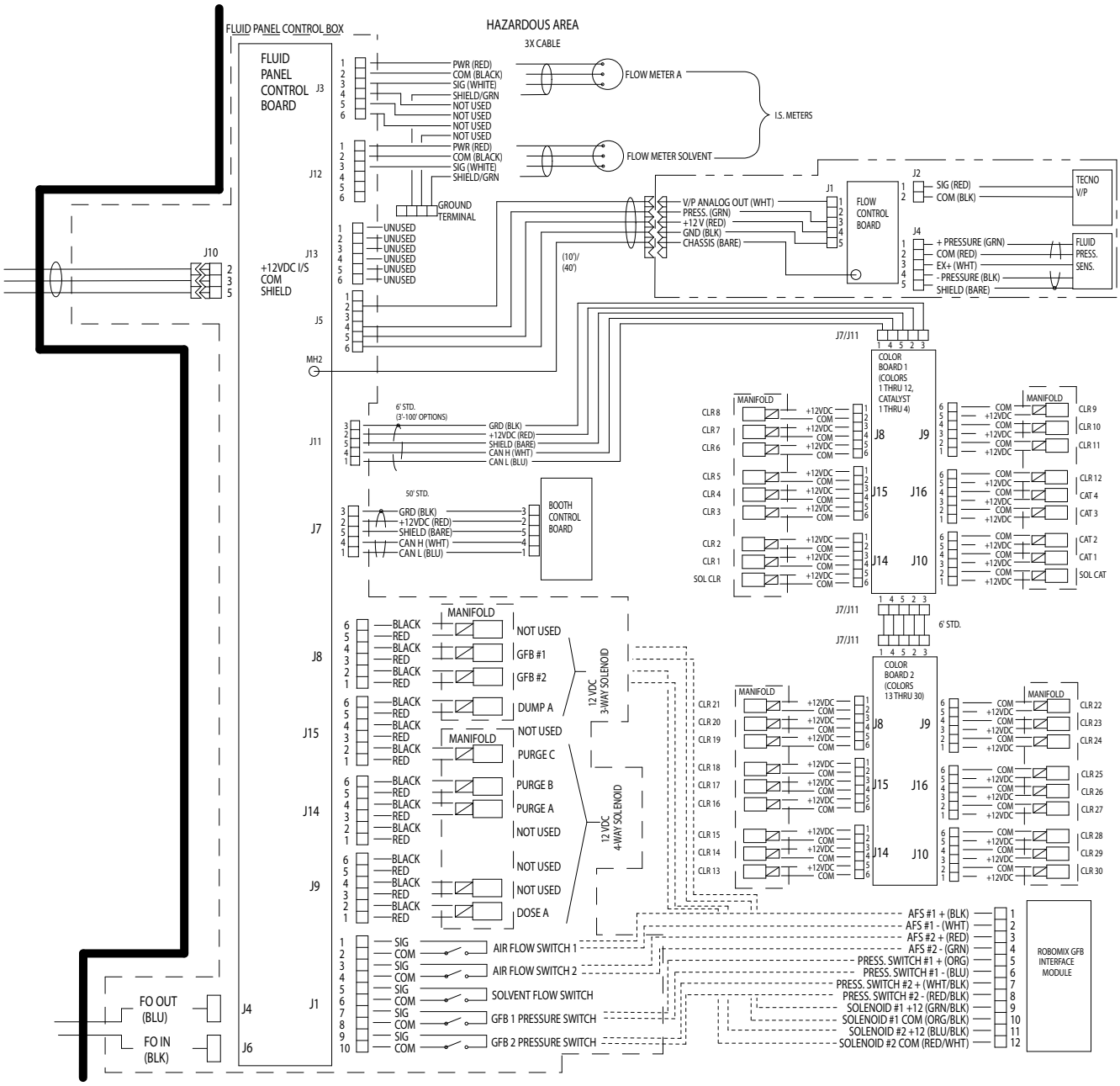
Non-Hazardous Area



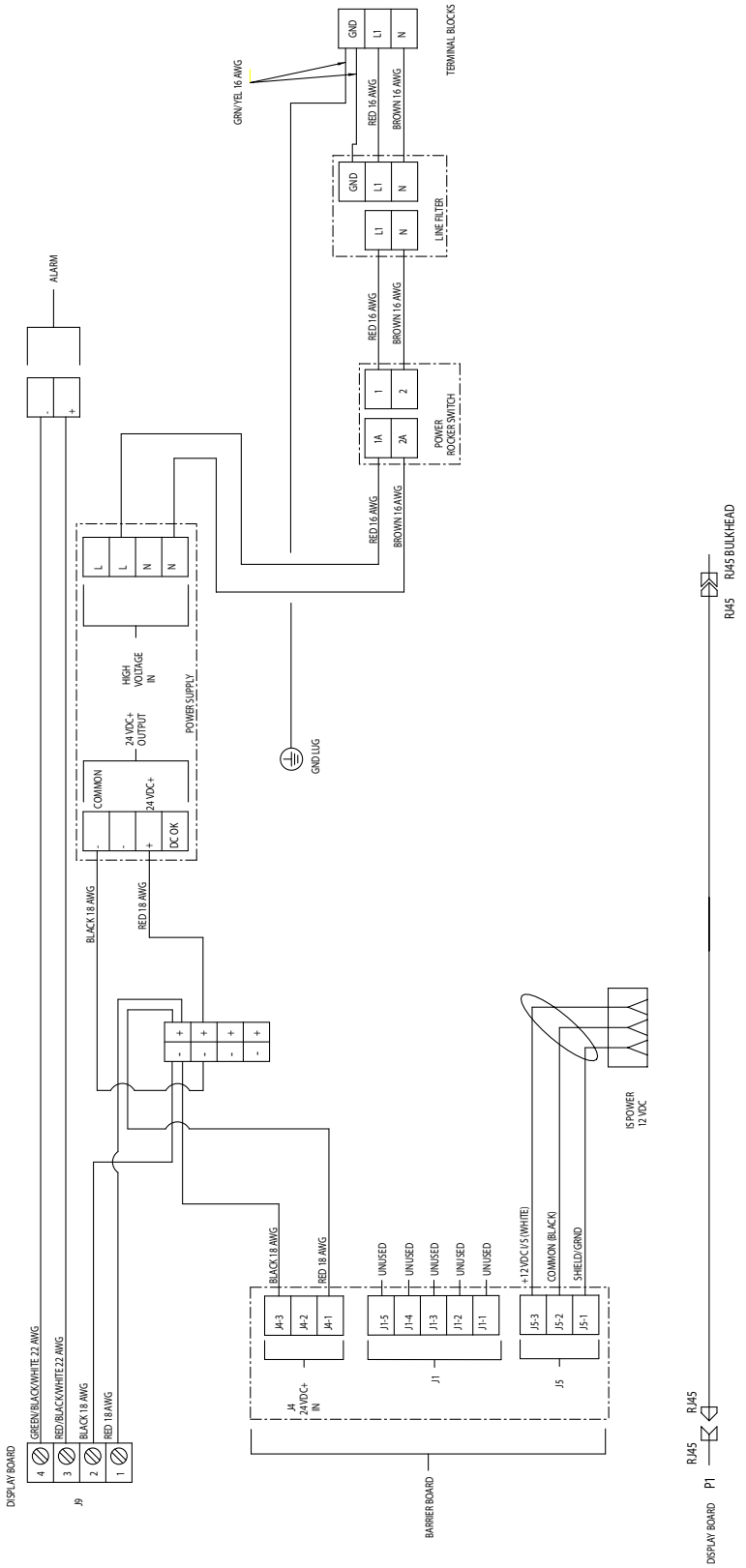
System Electrical Schematic

NOTE: The electrical schematic illustrates all possible wiring expansions in a ProControl 1KS system. Some components shown are not included with all systems.

Hazardous Area



EasyKey Electrical Schematic



Technical Data

Maximum fluid working pressure	*Base system:* 4000 psi (27.58 MPa, 275.8 bar) *Low pressure color change:* 300 psi (2.07 MPa, 20.6 bar) *Coriolis meter:* 2300 psi (15.86 MPa, 158.6 bar) *Flow control:* 190 psi (1.31 MPa, 13.1 bar)
Maximum working air pressure	100 psi (0.7 MPa, 7 bar)
Air supply	75 - 100 psi (0.5 - 0.7 MPa, 5.2 - 7 bar)
Air filter inlet size	3/8 npt(f)
Air filtration for air logic and purge air (Graco-supplied)	5 micron (minimum) filtration required; clean and dry air
Air filtration for atomizing air (user-supplied)	30 micron (minimum) filtration required; clean and dry air
Fluids handled	one component: • solvent and waterborne paints • polyurethanes • epoxies • acid catalyzed varnishes • moisture sensitive isocyanates
Viscosity range of fluid	20- 5000 cps*
Fluid filtration (user-supplied)	100 mesh minimum
Fluid flow rate range*	
G3000, G250 Meter	75 - 3800 cc/min. (0.02-1.00 gal./min.)
G3000HR, G250HR Meter	38 - 1900 cc/min. (0.01-0.50 gal./min.)
Coriolis Meter	20 - 3800 cc/min. (0.005-1.00 gal./min.)
S3000 Solvent Meter (accessory)	38 - 1900 cc/min. (0.01-0.50 gal./min.)
Fluid inlet sizes	
Flow Meter	1/4 npt(f)
Dose Valve/Color Valve Adapters	1/4 npt(f)
Fluid outlet size (static mixer)	1/4 npt(f)
External Power Supply Requirements	85 - 250 Vac, 50/60 Hz, 2 amps maximum draw 15 amp maximum circuit breaker required 8 to 14 AWG power supply wire gauge
Operating temperature range	41- 122° F (5-50° C)
Environmental Conditions Rating	indoor use, pollution degree (2), installation category II
Noise Level	
Sound pressure level	below 70 dBA
Sound power level	below 85 dBA
Wetted parts	303, 304 SST, Tungsten carbide (with nickel binder), perfluoroelastomer; PTFE

* Dependent on programmed K-factor and application. The maximum allowable flow meter pulse frequency is 425 Hz (pulses/sec). For more detailed information on viscosities, flow rates, or mixing ratios, consult your Graco distributor.

See individual component manuals for additional technical data.

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